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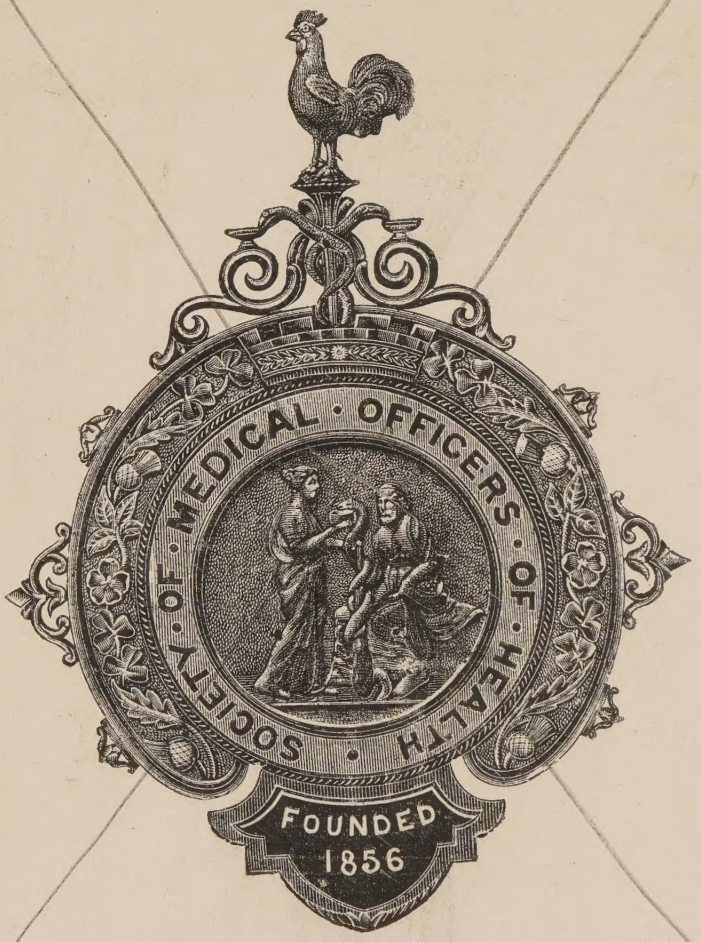


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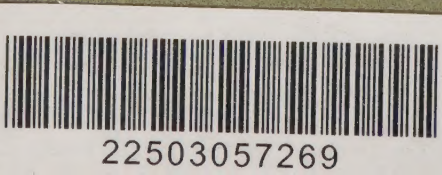
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THE

# SANITARY REVIEW,

AND

# Journal of Public Health.

EDITED BY

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NATIONAL HEALTH

IS NATIONAL WEALTH.

ΥΓΙΕΙΑ

*πρεσβίστη μακάρων.*

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THE

# SANITARY REVIEW.

APRIL 1858.

## THE HEALTH OF THE ENGLISH SOLDIER.

A WEIGHTY blue book lies before us on the subject of the health of the English soldier. The book has created lasting interest, and has given rise, even in the brief time that has elapsed since its issue, to several useful and necessary reforms. In the first pages of this REVIEW we drew attention to many of the facts recorded in the official document in hand; and in a special memorial to Lord Panmure, to which the names of several of the Commissioners who have taken part in the present inquiry were appended, we published what may be considered as the pith and the original stuff of all that has now been brought forward in relation to the sanitary requirements of our army.

But the report has taken the public by surprise. Its revelations, which are really but utterances in detail of similar revelations made years long since, and insisted on in general terms by at least a hundred writers past and present, falls now on the public ear with a startling sound. Why it has thus acted it is not difficult to understand. The people have been making themselves acquainted with military men and military affairs. They have felt in these days the value of their armed protectors. They have been making themselves acquainted with the wants of the soldier. They have not forgotten the Crimea, and its eventful horrors. Therefore the time is as ripe for this report, as the report is ripe for time. In addition, the book bears the stamp and seal of authority. Nunky tells what nunky pays. It is a great disadvantage, however, that the report, as a work to be bought, is too expensive to come into the hands of more than a favoured few. We have found, indeed, in conversation with numerous folk respecting this report, that they know about it only from hearsay or secondhand reading. To meet the wants of the community we shall, therefore, before offering a word of comment, give an abridgement of the report itself, supplying every important

fact and suggestion of a sanitary kind offered by the commissioners, and following their mode of arranging the information (which for once, in a blue book, is exceedingly happy) as closely as is compatible with our space and intention.

"*Rates of Mortality in the Army.* No principle in vital statistics is better established than that the rates of mortality differ widely among different ranks, classes, and occupations, and that such difference is permanent, when arising from permanent causes.

"It seemed to us, therefore, important to ascertain the rates of mortality incidental to the soldier's life, as compared with those of trades in which men of the same class and the same age are usually engaged, and the conditions of which bear the greatest resemblance to his own occupation.

"We must, however, premise that the army rate of mortality cannot be correctly calculated from the deaths per 1,000 of the troops during the period they are serving, because every year a certain per-centage of the force is invalided and pensioned, on account of disease contracted in the service; and of men so pensioned, a large per-centage die during the first year. The health of the army, as given in the returns, is therefore more favourable in appearance than in reality, on account of the constant discharge from its ranks of men in an advanced stage of disease, as we shall presently show.

"But if the rates of mortality of the soldier, even with this qualification, exceed those of the classes with which he is compared, then the causes of that excess should be investigated, and the means of removing them, or, if removal be impossible, of mitigating their intensity, be sought.

"The soldier is recruited generally at 19 years of age. He is drawn from two classes, the agricultural labourer and the working class in towns. He is carefully inspected by a surgeon, who rejects every man having any bodily infirmity, or bearing signs of future disease. Although the soldier's is, therefore, a picked life, we propose before contrasting the rates of the mortality to which he is subject with those of some special classes and occupations, to compare them with those of the male population generally at corresponding ages throughout England and Wales, as stated by the Registrar-General."

There is then supplied a Table which shows—

"That whereas the deaths in the general English male population at the army ages during the fifteen years from 1839 to 1853, calculated at the annual average of 9·2 per 1,000, would have been 16,211, the deaths in the British army at home and abroad were 58,139, being an excess of deaths among soldiers of no less than 41,928.

"It may, however, be fairly objected to this comparison, that the civilians in England are living in their own country, and in a temperate and healthy climate; whereas a large portion of the army is serving in every part of the globe, and is exposed to every vicissitude both of temperature and climate.

"The following tables are free from that objection, and show the comparative mortality of the army at home, and of the male civil population of England and Wales, between the same ages as the soldier, irrespective of the occupations in which they are engaged, and of the healthiest and unhealthiest portions of it, as stated by the Registrar-General.

*Rates of Mortality per* 1000 *per Annum.*

| | |
|---|---|
| Effective men of all ages of the army at home: | |
| Total | 17·5* |
| Household Cavalry | 11·0 |
| Dragoon Guards and Dragoons | 13·3 |
| Foot Guards | 20·4 |
| Infantry of the Line | 18·7 |
| Population of England and Wales, army ages: | |
| Town and country population | 9·2 |
| Country alone | 7·7 |
| One of the unhealthiest towns, army ages: | |
| Manchester | 12·4 |

*Rates of Mortality per* 1000 *Men of the Army at home, and of the English Civil Male Population, at corresponding quinquennial periods, as stated by the Registrar-General.*

| | | |
|---|---|---|
| Ages, 20 to 25, | Civilians | 8·4 |
| | Soldiers | 17·0 |
| 25 to 30, | Civilians | 9·2 |
| | Soldiers | 18·3 |
| 30 to 35, | Civilians | 10·2 |
| | Soldiers | 18·4 |
| 35 to 40, | Civilians | 11·6 |
| | Soldiers | 19·3 |

"From this it appears, that if the army at home were as healthy as the population from which it is drawn, soldiers would die at one-half the rate at which they die now.

"But, as we have already observed, the soldier's is a picked life. All men offering to enlist, who bear signs of physical weakness or of tendency to disease, are rejected, and, even after acceptance, can be discharged on the representation of the regimental surgeon at any period within three years from their admission; and all these rejected lives are thrown back on the civil population.

"The apparent health of the army is maintained by the continued influx of fresh lives in the place of those which are weeded out by the process of invaliding, by which means a large number of men, whose physical powers are exhausted, are thrown back on the civil population, while their removal lowers the rates of mortality of the army, though their deaths are owing to the military service which first undermined their health.

"Thus, if all corps were exposed to the same risks, and the invaliding in each were conducted on the same principle and with the same degree of stringency, the rate of mortality would be low in each arm of the service in proportion as the invaliding is high,

* The cause of the difference between these numbers and those given in the Army Statistical Report is, that the above are corrected for the numbers in the service at different ages.

and *vice versâ;* and the rate of mortality among the invalids themselves would be highest where the amount of invaliding was the lowest, and *vice versâ.* The following table, however, shows that, owing to different disturbing causes, the results produced are at variance with the rule above stated.

| | Annual Ratio discharged by Invaliding per 1000 serving. | | | | |
|---|---|---|---|---|---|
| | Under 7 Years Service. | 7 to 14 Years Service. | 14 to 21 in Infantry, and 24 in Cavalry. | Total und. 21 or 24 Years Service | Above 21 or 24 Years Service. |
| Household Cavalry - - | 6·2 | 13·6 | 35·1 | 15·2 | 531·3 |
| Cavalry of the Line serving at home - - - | 14·7 | 23·5 | 36·7 | 20·9 | 739·0 |
| Foot Guards - - - - - | 14·3 | 16·1 | 20 0 | 15·9 | 331·4 |
| Infantry of the Line serving at home - - - | 15·9 | 21·1 | 55·6 | 20·8 | 987·0 |

"To the State, the loss of the men by invaliding is the same as the loss by death. In either case the expense of obtaining and training a substitute must be incurred, and in either case the death of the man, whether he be a soldier in the receipt of pay, or an invalid in the receipt of pension, is equally attributable to military service.

"It is obvious, therefore, that the rates of mortality, taken alone, represent a part only of the loss annually caused in the ranks of the army by disease.

"We have been enabled to institute some comparisons between the rates of mortality of the soldier and those of civilians of different classes and occupations, the materials of which, so far as civil life is concerned, have been placed before us by Mr. Neison.

"It must be borne in mind that a great part of the soldier's duty is performed in the open air; that he receives, as compared with the agricultural classes, an ample supply of food, is well clothed, and is housed at a considerable expense.

"In all these respects, looking at his material position alone, his condition at first sight appears to resemble that of the agricultural labourer, though the latter has disadvantages from which the soldier is secured. If the agricultural labourer, not being a member of a friendly society, falls sick, he forfeits his wages, which are his only means of subsistence. His medical treatment is not lavish, nor the attendance in all cases immediate. If he be a member of a friendly society he has better attendance, and his sick pay puts him beyond the reach of privation.

"To the soldier the government stands in the place of the friendly society. If he be ill, however slight the malady, he at once goes to hospital, and has all the treatment and all the nourishment which his case may require.

"Materially speaking, therefore, the life of the soldier at home (and in the following comparisons we are speaking only of the troops in the United Kingdom) and that of the agricultural labourer

who is a member of a friendly society, would seem to be open to a fair comparison.

"The tables contained in the able paper by Mr. Neison show, however, that within corresponding ages the

Mortality of the Household Cavalry is = 1·8
" Dragoons, etc. - = 2·2
" Line - - = 2·9
" Guards - - = 3·3

} times as great as the mortality of agricultural labourers being members of friendly societies;*

which is only 6·056 deaths per annum in 1,000 as against 11·1 per 1,000 in the Household Cavalry, 13·5 in the Dragoons, 17·9 in the Infantry of the Line, and 20·4 in the Foot Guards.

"But it may be objected, that though the soldiers' are originally picked lives, and though the government secures to them the same advantages as those provided for their members by friendly societies, yet the moral element in the character of that labourer whose providence induces him to lay by from his wages against the future, gives him an advantage in a comparison with the army taken as a body, without reference to the habits of the individual soldier.

"The man who is provident is probably likewise industrious and sober, and his standard of health higher than that of men who have not the same qualities in a like degree. As regards this condition of providence, which is a moral condition, acting on a man's physical state, those soldiers only who are depositors in the Regimental Savings' Bank should be compared with the agricultural members of friendly societies. Unfortunately, however, the statistics of the army do not afford the materials for instituting such a comparison, though we think it most desirable that in future they should be so arranged.

"The results of comparisons between the rates of mortality of soldiers and the different classes and occupations, are placed in juxtaposition in the following table :—

| Deaths per 1,000 per Annum at Ages between 20 and 40. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Agricultural labourers. Members of Friendly Societies. | Labourers. Rural districts. Whether members of F.S. or not. | Out-door trades in towns requiring great or little exercise. Not F.S. | Trades in towns only partially out-door. Not F.S. | Printers. Not F.S. | Police. Not F.S. | Miners. Not F.S. | Household Cavalry. | Dragoon Guards and Dragoons. | Infantry of the Line. | Foot Guards. | Artillery. |
| 6·055 | 8·002 | 8·538 | 8·449 | 9·090 | 8·922 | 10·314 | 11·1 | 13·5 | 17·8 | 20·4 | — |

* In these comparisons with various civil occupations or societies, it must be remembered that the persons engaged in them frequently withdraw, thus reducing the rates of mortality of the occupation which they leave; but against this must be set the discharge and invaliding of soldiers; the withdrawal, however, in the former case being at the will of the employed, in the latter at the will of the military authorities.

"The occupation which comes nearest to the army as regards its rate of mortality, is that of clerks. The close application to business, the sedentary attitude, the want of exercise and of fresh air, render their employment one of the most unhealthy of all extensive occupations.

"It seems almost incredible that it should be necessary to have recourse to the most unhealthy occupations in order to institute any comparison in which the rates of mortality shall approximate to those prevailing among your Majesty's troops, for at present the army stands almost at the head of unhealthy occupations in the United Kingdom.

"It is true, that though these comparisons between the army and various occupations in civil life have been confined to the troops quartered at home, yet, a large proportion of the latter having served abroad, sometimes in unhealthy climates, such as India and the West Indies, many have had the seeds of disease implanted in them during their tropical service. That many of these stations are extremely prejudicial to health is clearly shown.

"But the Guards, it must be observed, who have the highest rates of mortality of all the troops serving in the United Kingdom, do no Indian nor colonial duty, and the majority of the cavalry serves almost as exclusively at home.

"The following table shows the deaths per 1,000, on different stations in the navy and army, from 1830 to 1836:—

| | Navy. | Army. |
|---|---|---|
| On the home station - - - - | 8·8 | 13·7 |
| Mediterranean, including, in navy, the peninsular command - | 9·2 | 18· |
| Naval forces in the East India command and troops in Ceylon | 15·1 | 46·2 |

"But a certain proportion of this superiority on the part of the navy is accounted for by the larger amount of invaliding in that service than in the army, as will be seen from the following table:—

| | No. of men invalided per 1000. Navy. | Army. |
|---|---|---|
| Home station - - - | 38·2 | 25·3 |
| Mediterranean - - - | 25·7 | 9·5 |
| East India command and Ceylon - | 33·6 | 3·6 |

"The following table, for a later period, shows the mortality *from disease alone* in the navy, in the seven years, 1837-43:—

| | Per 1000 Annually. | |
|---|---|---|
| Home - - | 6·8 | |
| South America - | 6·7 | |
| Various - - | 8· | |
| Packet Service - | 8·6 | |
| North Coast, Spain | 8·5 | Four years average only. |
| Mediterranean - | 10·7 | |
| Cape - - | 11· | |
| West Indies - | 19·2 | Unhealthy stations. |
| East Indies - | 34·2 | |
| West Coast, Africa - | 57·0 | |
| Annual average per 1000 - | 14·9 | Mean force 33,000. |

"From this it appears that, though on the most unhealthy sta-

tion, the mortality reaches 57 per 1,000, among the seamen at home, who generally are young men entering the service, it is less than that of the general population at the same ages; but it must be remembered that the disadvantage of foreign service is more than compensated by the constant removal of the weak and sickly men by invaliding, both from the army and navy. How largely the apparent rates of mortality are reduced by this process may be inferred from the fact stated by Sir Alexander Tulloch, that among the men discharged from the army on temporary pension, the deaths are no less than 119 per thousand per annum. The amount of loss to the army by death and by invaliding is well illustrated by the series of diagrams by Dr. Farr, which are to be found in the Appendix P. 526.

"*Causes of Mortality.* The causes assigned to us for these high rates of mortality are:—

"1. Night duty.

"2. Want of exercise and suitable employment.

"3. Intemperate and debauched habits among the soldiers.

"4. Crowding and insufficient ventilation, and nuisances arising from latrines and defective sewerage in barracks.

"Without rejecting any cause which may contribute in any degree to the deterioration of the health of the soldier, we are, after a careful investigation of the subject, disposed to attach little comparative importance to the first head. The comparison with the police, who perform a night duty far more severe and yet have a rate of mortality of only one-half that of the infantry of the line, and less than one-half of that of the Guards, seems to support our conclusion. It has been stated, however, that practically the service of the police lasts on an average but five years, owing to the frequency of invaliding or resignation on account of ill health, whereas the average service of the soldier is considerably longer.

"Taking, however, the first five years of a soldier's duty, namely, from 20 to 25 years of age, assuming that some months have been spent in drill, and comparing it with the five average years of the policeman who begins his service at 25 (a comparison in which the relative age is in favour of the soldier), we find that the mortality in the infantry of the line is 17·8 per 1,000, and in the Guards 20·4 per 1,000, against 8·92 per 1,000 in the police.

"It appears, likewise, that when the Guards were engaged in the suppression of the outbreak in Canada, in 1838, their rates of mortality, which at home are in excess of those of the infantry of the line, upon that occasion fell below them. The mortality in the line during that period, in Canada, being 16·5 per 1,000 per annum, and that of the Guards 14·5 per 1,000.

"The second division of the subject assigns a cause of disease and mortality to the existence of which, without the evidence which we are enabled to adduce upon the subject, many would be indisposed to give credence, viz., the want of exercise and suitable employment.

"Of all classes of this country, including trades, occupations, and professions, and including also what may be called the affluent or easy classes, the longest lived is the agricultural labourer. He is neither the best fed, nor the best clothed, nor the best housed man in the country. In many districts he is quoted, and truly quoted, as the reverse. But the one condition in which he differs most from all other classes is the amount and the variety of exercise which he takes in the open air.

"Throughout the tables, showing the rates of mortality in different trades and occupations, those whose avocations require much exercise, whether in doors or out of doors, have almost invariably a decided advantage over those requiring less muscular exertion. The rates of mortality of the cavalry of the line, as has been already shown, are but 13·6 per annum in a thousand, as against 17·9 in the infantry of the line; and this difference, we believe, is in some degree attributable to the greater number of hours passed out of doors on duty by the trooper, the variety of exercise which he takes,—part of his duty being on horseback, part on foot,—and the amount of muscular exertion required of him in grooming his horse, which is far greater than any exacted of the infantry soldier. His stable duty, as well as his sword exercise, calls into activity a different set of muscles to those exercised by men in marching. Indeed, all the attitudes of the foot soldier on parade, at drill, and on the march, are singularly monotonous and constrained, and it is rare to see an infantry soldier whose figure is as fully developed or as well set up as that of the cavalry soldier.

"This is the manner in which his day is spent by the private in the Foot Guards:—

"He gets up at six. There is no drill before breakfast; he makes up his bed and cleans his things; he gets his breakfast at seven. He turns out for drill at half-past seven or eight; his drill may last an hour and a half. If it be guard day there is no drill, except for defaulters. The men for duty are paraded at 10 o'clock; that finishes his day's drill altogether. There is evening parade, which takes half an hour; and then his time is his own till tattoo, which is at nine in winter and ten in summer. That is the day of a soldier not on guard, or not belonging to the company which is out for minié practice.

"Of the hours which the soldier has to himself he spends a very small portion in exercise or out of doors; and Colonel Lindsay, the Quartermaster-General, and Generals Mansell and Lawrence, all recommend that every encouragement and facility should be given to the soldier to practise athletic and out-of-door games and sports, as necessary both for his physical and moral health.

"In the French army these considerations are so entirely recognized, and so great is the importance attached to them, that not only are the soldiers made to pass through a certain course of gymnastic exercises, but among the duties prescribed in the in-

structions for the medical inspectors is that of inquiring into the practice of these exercises in their districts. We are, therefore, inclined to place want of exercise, and especially of that species of exercise which useful labour supplies, and which would brace and develop the chest and frame, among the causes of the sickness and mortality of the infantry soldier.

"The low rate of mortality in the navy, in which service the men, though necessarily berthed in a very confined space, undergo an immense amount of exercise, calling the greatest variety of muscle into play, and pass a large proportion both of day and night in the open air, appears to favour the opinion we have here expressed.

"As regards the third head, namely, intemperance, if by intemperance be meant drinking to intoxication, we have no reason to think that the soldier is more intemperate than the average of the class from which he originally comes. He has no large sum paid weekly into his hands, with which to spend one or two days in drunkenness, if he were so inclined; nor, with the vigilant discipline exercised over him, could he do so with impunity. But that the soldier frequently indulges in the use of stimulating liquors, to an extent which may injure his health, though not deprive him of his senses, cannot, we think, be denied.

"Mr. Neison states, that the results of an inquiry made into the rate of mortality amongst persons of intemperate habits show that, at ages corresponding to those of soldiers, there is, relatively to the deaths from all other causes, an excessive development of diseases of the "nervous system," and of the "digestive organs."

"In England and Wales these two groups of diseases, at ages from 20 upwards, constitute 15·95 per cent. of the deaths from all causes; but amongst intemperate persons Mr. Neison asserts that they form 50·4 per cent. of all the deaths that take place, being more than three times the general average. These diseases may, according to him, therefore, be regarded, to some extent, as distinctive types of the causes of death amongst intemperate persons, and their paucity or predominance would, in his opinion, fairly lead to inferences as to the general regularity or irregularity of the previous habits of the persons whose deaths they caused.

"But in the service the higher the mortality of the different branches, the greater is the relative amount of deaths caused by diseases of the respiratory organs; in other words, in the household cavalry, which is the healthiest service, the deaths by diseases of the nervous system and digestive organs are as many as one-fifth of those caused by diseases of the respiratory organs, while in the Foot Guards, which is the unhealthiest, they constitute but one-eleventh.

"That the health of the army, like the health of the working classes in this country, would be much improved by greater abstinence from strong liquors, appears to us indisputable. We doubt, however, whether there is now such a difference in the habits of

the soldier and those of the labourer or the mechanic in that respect, as would account for the extraordinary excess in the rates of mortality of the former over those of the latter.

"There is, doubtless, a greater amount of dissipation of other kinds among soldiers than among young men of the same class in civil life. Their residence in towns offers great temptation and great facilities for sexual debauchery; and the diseases which are thereby generated,—the existence of which the soldier, from one cause or another, frequently conceals, thereby greatly adding to the intensity of the malady and the difficulty of cure, as well as to the necessary severity of the treatment,—no doubt have a most injurious effect on his constitution.

"There remain to be considered the effects on the health of the army of overcrowding, of insufficient ventilation, of defective sewerage, and of other noxious agencies of analogous character in barracks, and before doing so, we deem it right to call attention to the influence of pulmonary affections on the mortality of the troops, as compared with the mortality occasioned by the same diseases in civil life.

"The following table shows the total annual mortality per 1,000 of the troops of different arms, and of civilians in 24 large towns, at the soldiers' ages, by different diseases, and the proportions of deaths caused in either case, by chest and tubercular, as distinguished from other diseases.

| Ratio of Deaths per 1000 of Mean Strength. | Household Cavalry. | Dragoon Guards and Dragoons. | Foot Guards. | Infantry of the Line. | Civil population of 24 large Towns. |
|---|---|---|---|---|---|
| Inflammation of the lungs, pleurisy, and acute catarrh | ·2 | ·7 | 1·3 | 1·3 | ·5 |
| Spitting blood, consumption, chronic catarrh, asthma, difficulty of breathing | 6·4 | 6·6 | 12·5 | 8·9 | 5·8 |
| All causes - - - - - - | 11·1 | 13·6 | 20·4 | 17·9 | 11·9 |

"From this table it appears that while in civil life at the soldiers' ages, the deaths by pulmonary diseases are 6·3 per 1,000 they amount in the cavalry to 7·3; in the infantry of the line to 10·2; in the guards to 13·8 per 1,000, and that of the entire number of deaths from all causes in the army, diseases of the lungs constitute the following proportion; namely, in the cavalry 53·9 per cent.; in the infantry of the line 57·277 per cent.; in the guards 67·683 per cent.

"It may be stated, that in civil life insufficient clothing, insufficient and unwholesome food, sedentary and unwholesome occupations, and the vitiated and atmosphere of unhealthy dwellings, all contribute to the propagation of this class of diseases. But in the army it cannot be alleged that the clothing, the food, or the nature of the occupation in itself are of a character which would

justify the imputation that they are among the predisposing causes of the excessive mortality of the soldier by pulmonary disease.

"One cause alone, viz., a vitiated air, acts with such intensity, especially when superadded to a certain amount of exposure, as not only to produce in the Foot Guards an amount of the disease in question, which is greater than is produced in civil life by all the four causes united, but which actually carries off annually a number of men in the infantry nearly equalling, and in the Guards actually exceeding, the number of civilians of the same age who die of all diseases put together.

"Even here again, it must, however, be remembered that the returns of death occasioned by pulmonary affections in the army do not present the whole amount of mortality caused by this class of diseases, a large number of men being constantly invalided and discharged from the army when incapacitated for duty by the progress of the malady.

"It has been stated to us as a fact so singular that it deserves further inquiry, that the only army in which the mortality does not much, if at all, exceed that of the population from which it is drawn, so far as the latter can be ascertained, is the native army in India, whose rates are slightly lower than those of the native civil population of those districts in which the rates of mortality are known.

"It is also the only army with which we are acquainted which is not barracked. The sepoy receives a small sum under the name of hutting money, with which each man erects for himself a rude construction with mats, and other articles of a similar character; and he frequently sleeps outside of the hut so erected.

"It is also a fact worthy of notice, that the mortality of the army when hutted before Sevastopol in 1856, as compared with that of the troops at home, was nearly one-third less than the mortality of the infantry of the line, and two-fifths less than that of the Foot Guards when barracked in England. The numbers are as follows:—

> "The mortality of the army before Sevastopol, during 22 weeks ending May 31, 1856, was, including deaths by violence or accident, at the rate of but 12·5 per 1,000 per annum, as against 17·9 in the infantry and 20·4 in the Guards when quartered in England.

"Perhaps no army was ever better cared for, or more sanitary precautions taken in its behalf as regards drainage, both of surface and subsoil, cleanliness, ventilation of huts, diet, clothing, etc., than the army before Sevastopol, during the period mentioned. In the month of May alone the mortality was at the rate of only 8 per 1,000 per annum.

"Again, the cavalry at home, whose rates of mortality are lower than those of any of Your Majesty's troops, are generally less crowded in their barracks than the infantry; the reduced strength of the cavalry regiments leaving greater space for the accommodation of each man.

"In considering the effect on health of the constant breathing of a vitiated atmosphere in barracks, it must be borne in mind, that 57·277 per cent. of the deaths in the infantry of the line are caused by diseases of the respiratory organs, and of the Guards no less than 67·683 per cent.

"*Barracks.* The dormitories or barrack rooms are very confined, the minimum cubic space allowed to each soldier by regulation being only 450 feet, and in a majority of cases even this minimum is not attained, and in a number of barracks there is a deficiency of one-third, and in some instances of more than one-half of the space allotted by regulation. Sir John M'Neill states, that the pauper in the Scotch workhouses is allowed 480 feet per bed, and not only is this minimum rigidly insisted upon, but the houses being scarcely ever full it is practically much exceeded, and the pauper is never in his dormitory during the day. In the barrack, on the other hand, it is stated by some non-commissioned officers examined by the Barrack Committee, that even the regulated space of one foot between the beds is practically unattained; and all experience goes to prove, that the amount of interval allowed between the beds is of more consequence, so far as health is concerned, than the mere amount of cubic space given above by the altitude of the room. Owing to the ordinary construction of the buildings, the barrack rooms very seldom have windows at opposite sides or ends of the room, and there are, consequently, very insufficient means of ventilation, though the number of men sleeping together in a confined space renders every access of fresh air the more necessary. Even where ventilators exist, they are frequently stopped up by the men themselves, who come from a class very little persuaded of the advantages of ventilation, and whom poverty has accustomed from their youth up to look to the exclusion of the external air, in the absence of fuel, as the best mode of securing warmth. Barrack-rooms are occasionally found in the basement of the building, approached by descending steps from the natural surface level, the tops of the windows, which open on one side only of the rooms, being little, if at all, above such surface level; and in low rooms thus situated a number of men may be found lodged in beds so closely ranged that the side of one touches the side of the other. The result is, that the soldier sleeps in a fœtid and unwholesome atmosphere, the habitual breathing of which, though producing for the most part no direct immediate effects, probably lays the seeds of that pulmonary disease which is so fatal in the British army. Of the state of this atmosphere, abundant evidence, though of a most disgusting nature, is to be found in the statements of the witnesses before the Barrack Committee.

"Colour-serjeant Reynolds being asked, 'Did you observe any ill effect arise to the health of the men, or to their spirits, in consequence of the atmosphere in which they were shut up at night?' says, 'There used to be frequent complaints; there was a good

deal of coughing, and it used to cause a phthisicky sensation in the throat, and spitting in the morning.'

"It must be remembered that in the barrack-rooms, the atmosphere of which we have described, the men are expected to take all their meals, and the number of hours they spend in them during the day makes their thorough purification before the return of night almost impossible.

"*Encampments.* Under the existing system the medical officer is required by the regulations to examine the ventilation and cleanliness of the barracks and quarters, and to suggest improvements to the commanding-officer, sending a copy of such suggestions to the Director-General. He is also required, upon the occurrence of cholera or any other formidable disease, to report to the Director-General his opinion as to its cause, and the treatment adopted. But no power is given him to carry into operation any of the measures he may deem necessary, nor is there any regulation authorising him to press upon his commanding officer the adoption or even the consideration of his suggestions, if the latter be not disposed to consult him. There is in this respect a total, and, as it appears to us, injurious want of connection betwen the medical and executive departments of the army.

"*Ration.* The ration of the British soldier consists at home of 1 lb. of bread and $\frac{3}{4}$ lb. of meat, at which rate it was fixed so far back as 1813, and has never since varied, except that by a warrant dated February 1833, an additional $\frac{1}{2}$ lb. of bread was given to troops encamped in England.

"Abroad, the ration consists of 1 lb. of bread or $\frac{3}{4}$ lb of biscuit, and 1 lb. of meat, either fresh or salt, the additional $\frac{1}{4}$ of a pound being given to compensate for the inferior quality of foreign compared with English meat. There are, however, two exceptional rations still given, one at Hong Kong, and the other at certain out-post stations at the Cape of Good Hope, where additional articles are supplied, for which the soldier pays one penny at the former, and three half-pence at the latter station.

"But the $\frac{3}{4}$ lb. of meat and 1 lb. of bread at home, and the 1 lb. of meat and 1 lb. of bread abroad, with the stoppages of $4\frac{1}{2}d.$ in the one case and $3\frac{1}{2}d.$ in the other, by no means represent either the amount of food daily consumed by the soldier, or the amount of money which he pays for it. Indeed a mere bread and meat ration, even if increased in quantity, could never ensure health, without the addition of vegetable food.

"Some years ago the practice of having a third meal in the afternoon was introduced into some regiments by commanding officers, who paid much attention to the health and well being of their men, the expense being defrayed by a stoppage made by consent in the regiment. Up to that time the soldier had but two meals, breakfast at half-past 7, and dinner at half-past 12; there remained therefore an interval of nineteen hours during which the soldier might be altogether without sustenance; and though in

most cases he probably obtained a meal at his own expense, the soldier had no guarantee that he got it at the lowest cost, nor had the public any security that the meal was the best or the wholesomest that could be provided for him.

"The good effect of the introduction of this third meal on the discipline as well as the health of the men was remarkable. The meal acted as a roll-call, bringing men back into barrack towards evening; while the substitution of solid food for the dram to which exhausted men had recourse diminished drunkenness.

"*Cooking.* At present, in barrack as in hospital, but one mode of dressing food is recognised or provided. Coppers for boiling exist in every barrack, but no meat can be baked, roasted, stewed, or fried.

"When a soldier, therefore, enters the service, he has the prospect of dining on boiled meat every day for twenty-one years, if he is enabled to serve so long. There can be no doubt that some variety, not only in the material, but in the preparation of food, is necessary to ensure its being palatable; and we have it stated in evidence that men frequently leave part of their meat, which, when cooked and free from bone, does not much exceed half a pound, their stomach loathing the constant repetition of the same food in the same form.

"The experience of Dr. Balfour at Chelsea shows that a variety in the mode of cooking the food consumed has produced a higher standard of health among the boys in the Royal Military Asylum, with a positive diminution in expense. That the men themselves attach much importance to obtaining this variety is proved by the fact that they send out their meat on certain days in the week, at their own expense, to bakers in the towns where they are quartered, in order to have it cooked differently from what can be done in the barrack kitchens.

"*Clothing.* Of late years great improvement has been made in the clothing of the troops. The form of tunic now adopted affords protection to the hips and belly of the wearer which the coatee did not. The material is stated to be better than that formerly in use, and the fashion of tight clothing is for the present at least discarded. Too much importance cannot be attached to an easy adjustment of the clothing, so as to leave to the respiratory and other organs of the body, as well as to its muscular development, the utmost freedom. Great benefit is stated to have resulted from the use of the canvas frock at the Cape and in the Crimea, in lieu of the cloth tunic. As regards under-clothing, the balance of evidence, both of commanding and medical officers, is in favour of the flannel shirt. But the opinion of the non-commissioned officers examined was decidedly unfavourable to it, principally on the ground of the increased cost of the article, which is one of the necessaries kept up at the expense of the soldier.

"The quality of the boots is complained of, and it has been suggested that a boot should be adopted, capable of being laced over

the trouser, as the French gaiter is buttoned on the march, so as to prevent the accumulation of wet and mud on the loose trowser round the ankle.

"The stiff stock is condemned by almost every one who has given his opinion upon it.

"But the most difficult problem to solve in army costume is the head-dress. Formerly it was a *sine quâ non* that the head-dress should protect the head of the wearer from a sabre-cut. It was looked upon as armour still used for the protection of the head. We doubt the value of this protection, if it be purchased at the expense of a degree of weight and of heat likely to prove injurious to far more men than it will ever preserve from sabre wounds. The altered system of warfare, from the daily increasing range of the weapons used, renders the attempted protection of particular parts of the body more than ever useless; aad it becomes the more important to consider what character of head-gear will afford the best protection to the head, not from sabre or bullet, but from heat, cold, and wet, and can be worn most conveniently by the soldier on the march or when sleeping at the bivouac.

"Much complaint has been made by witnesses of the form of the peak of the forage-cap (now no longer worn), but which had none of the advantages of a peak, as it either afforded no protection to the eyes, or, by coming down close upon them, created so heated an atmosphere as sensibly to incommode them.

"This applies, though in a less degree, to the shako now in use.

"The busby is stated, from its form or want of form, to press in a narrow circle on the man's forehead to a degree very painful to the wearer. There is no reason why the interior of the busby should not be adapted to the form of the human head, though the exterior should still preserve its rectilinear shape.

"We are satisfied that the shako is, from its colour, weight, material, and form, altogether inapplicable to tropical climates such as those in which some of our troops psss a great portion of their lives. For them there is no head-dress giving so efficient a protection to the head, face, and neck as a light cap covered by wadded linen, with a flap hanging down behind, or else a few yards of linen rolled, turban fashion, round the forage cap; and we recommend the adoption of some such head-dress in India and all climates of similar temperature.

"The great coat worn in the British army is of very bad material, of little use against cold, while it readily imbibes and retains wet.

"*Effect of Sanitary Measures.* It ought not to be possible to say, as was said by a witness whom we examined, that a soldier never knows a healthy home, as regards air and space, till he commits some crime which brings him into the thoroughly ventilated cell of a military prison; or, as another witness stated,—

"'That a soldier's barrack room at present has not the least pretension to the comforts of an ordinary dwelling-house, and, what is infinitely more disgraceful, there is not even the attempt made to introduce into it the decencies of civilized life.'

"The strongest example of what well-directed care and precaution of a sanitary kind can effect, is to be found in the comparative health, at different periods, of the army in the Crimea. The example is of singular virtue, inasmuch as it offers to our view the most complete case on record, on the largest scale, of neglects committed, of consequences incurred, of remedies applied, and of consequent improvements in health and efficiency. Without entering into any of the controversies now we trust at an end, as to what was or what was not avoidable in a winter campaign, with an army unacclimated to war during a siege unexampled in its character, the facts remain, and it is our duty not to neglect the lessons that may be drawn from them.

"Throughout the winter of 1854-5 the troops were suffering from work altogether disproportioned to their strength, from broken rest, insufficient clothing and shelter, unwholesome food, and want of cleanliness. As the spring advanced, to these causes of disease and mortality were added others, arising from want of drainage and ventilation, and the nuisances resulting from the lengthened occupation of the same ground, without sufficient countervailing precautions. Throughout the period of seven months, from October 1, 1854, to April 30, 1855, the rate of mortality rose as high as 600 per 1,000 per annum. But in November and December of 1855, with supplies abundant, food of a wholesome character, and improving sanitary conditions, the rate of mortality per 1,000 per annum had already fallen to 44 and 33; and with huts well drained and ventilated, nuisances removed, and the camps thoroughly cleansed, from January to May, 1856, the rate of mortality of the army in the Crimea per 1,000 per annum fell to 12½ and in May to 8, as against 17·8 in the infantry at home. Diagrams H. I. and K., Appendix No. lxxii., illustrate the variations in the rates of mortality in the army in the East during the Russian war.

"*Hospitals.* Before discussing the changes which we think requisite in the organization of army hospitals, it is desirable to give a short account of the existing hospitals, and the system on which they are managed.

"The army general hospitals in Great Britain and Ireland are three in number, and are situated at Chatham, Dublin, and Cork; but the latter is on a most limited scale. There are none in the colonies nor in India, except the Company's general hospital existing at each of the three presidencies, and such temporary general hospitals as may be formed with armies in the field.

"Besides these, there are others equalling the general hospitals in extent, such as the hospitals at Dublin, Woolwich, Portsmouth, Plymouth, Aldershot, and Shorncliff; these, however, are not general hospitals, but merely congeries of several regimental hospitals, each remaining as completely distinct, in point of medical and other attendance and supervision, as though placed in the separate barracks in which their respective regiments are quartered.

"*Military Hospitals at Home.* The contracted space and want of ventilation in our military hospitals do not give to the patients the same chance of recovery as is afforded by the better accommodation of the naval and civil hospitals of this country.

"*Field Hospitals.* We would here observe, that in no case when it can possibly be avoided should the sick be treated in bell tents. They are described as hot in summer, wet in autumn, cold in winter, unpleasant during windy weather, too confined for the performance of professional duties, ill adapted to the nursing of sick men, and far too limited on the floor to enable medical officers to render patients in any degree comfortable. On the line of march they may suffice as a shelter for transient and slight cases.

"On the other hand, marquees can be made comfortable in a standing camp by means of portable bedsteads arranged on each side, with a passage along the middle. They are temperate in hot weather, dry when it rains, moderately comfortable during the prevalence of high winds, afford greater shelter than bell tents against cold, enable medical officers to approach the patients with more comfort to themselves, and permit the orderlies to attend better to the wants of the sick. But it is of the utmost importance that they should be thoroughly ventilated, in which respect there is great room for improvement.

"*Returns, Registers, &c.* Our attention has been drawn to the complaints, made by the medical officers, of the great amount of clerical labour thrown upon them by the cumbrous nature of the returns required of them, and the unnecessary writing caused by the unceasing and frequent recourse to the system of requisitions.

"It appeared to us that the true way of diminishing the necessity of a frequent recourse to requisitions upon the purveyor is to introduce variety in the ordinary hospital diets, on which subject we have already made a recommendation, so as to comprise under the head of a diet such of the extras as are now the most usual subjects of requisition; indeed, it not unfrequently happens that a patient is continuously and almost entirely dieted on extras, which must, nevertheless, be the subject of daily requisition. As the diet table is as complete a voucher to the purveyor, this change would greatly diminish the amount of writing and the number of separate transactions involved by a recourse to requisition, without in any degree diminishing the financial check upon the expenditure, which we consider it a paramount necessity to maintain.

"*Statistics.* The ultimate fate of an army frequently depends more on the intensity of its diseases and upon their causes than on their extent; and it is important that the Commander of the Forces should know what proportion of his disabled force is suffering from wounds and what from disease, and of the latter what proportion is attributable to that class of maladies which experience has shown can be greatly diminished in severity by sanitary measures. For this purpose an improved classification of diseases should be adopted in the regimental 'weekly states,' whereby

the zymotic diseases would be shown in a group by themselves; and every medical officer should be required, as is now sometimes done, to write upon the "state" the sanitary or other defects which may have predisposed the men to such diseases.

"Dr. Farr, who is the head of the Statistical Department of the Registrar-General's office, informed us that the Registrar-General is anxious to incorporate with his periodical reports the mortality of the British army, so as to include in one view the deaths of all classes of Englishmen, whether at home or abroad, who have not, like emigrants or exiles, severed the tie which bound them to their own country.

SUMMARY OF RECOMMENDATIONS.

"*Barracks, &c.* We recommend that in future a minimum cubic space of not less than 600 feet be allotted to each man in his barrack-room and in the guard-room, and that an interval of at least three feet be allowed between each bed in the former.

"That urine-tubs be on no account tolerated in the barrack-rooms; but that urinals with a water supply outside the barrack-room, or common chamber utensils, be substituted.

"That every barrack should contain ablution rooms and baths, laundry and drying-room, and workshops; and also, that suitable provision be made for non-commissioned officers' and married soldiers' quarters.

"That day-rooms be constructed for the use of the men in some of the principal barracks at home, and, if found advantageous, that they be extended to all barracks.

"That all barrack-rooms, guard-rooms, and day-rooms be sufficiently warmed and lighted, whatever may be the number of men occupying them; and that gas be used for lighting whenever it is obtainable.

"That, with a view to enable the soldier to have variety in his meals, the means of baking, frying, &c., be provided in the kitchens of all barracks and hospitals.

"That a Commission be immediately appointed, consisting of an engineer officer, and a medical officer versed in the practical application of sanitary science, who, together with the medical officer and the barrack-master of the inspected barrack, shall undertake the inspection of every barrack, and execute the necessary works, until every barrack in use shall, in its turn, have been brought to a healthy and satisfactory condition; and that in the meanwhile, immediate orders be given to the barrack department to revise the allotment of men to rooms, so as to divide the cubic space more equally.

"That, in future, before a barrack is built, the advice and opinion of competent medical officers be taken as regards both the site and plan.

"That, in order to secure that sanitary considerations shall not be overlooked in the choice of sites for encampments, hospitals, barracks, or in any matter involving the health of the troops, such

as water supply, drainage, food, clothing, &c., medical officers be invariably consulted; and in order to fix on commanding officers and on medical officers the responsibility properly belonging to each, that the medical officer shall be required to give his advice in writing, the commanding officer to affix in writing his reasons for rejecting it, if he think fit to do so, and to transmit the document to superior authority.

"That, in order to secure to the commanding officer of an army in the field the most efficient sanitary advice, and to relieve the principal medical officer of duties which his other avocations leave him no time to perform, a sanitary officer be appointed to act under the authority of the principal medical officer, but to be attached to the staff of the quartermaster-general.

"That facilities and encouragement be given for all athletic games, such as fives, cricket, quoit, single-stick, for gymnastic exercises, &c., and that the men be employed on different kinds of labour when possible.

"*Rations and Clothing.* We recommend the consolidation of the present stoppages for ration and regimental messing, and, in consideration of that consolidated stoppage, the issue to the soldier by the commissariat of a sufficient amount of food for three daily meals, including vegetables, tea, coffee, and sugar, with such variations abroad as the climate or the market may render necessary.

"That the soldiers' 'necessaries,' hitherto obtained by regimental contract, be provided by the commissariat.

"We recommend the adoption of a better boot; also a lighter stock of the pattern specified; a more horizontal peak to the forage cap; and the substitution of a light cap, with a wadded linen cover or a roll of linen, for the shako in hot climates.

"That greater attention be paid to the interior form of the headdress, whether shako or busby; that the great coat be of a better quality and more durable texture; that all clothing be made sufficiently loose to permit the free use of the limbs and unimpeded action of the muscles, and that the material of the clothing be varied according to the climates in which the troops may be serving.

"We strongly recommend the immediate testing, by its issue to half a battalion, of the 'Berrington' knapsack sling.

"*Hospitals.* We recommend that in all cases competent medical sanitary officers should be consulted as regards the selection of site, and the original construction of hospitals to be built.

"That the present minimum space allowed by the regulations to each bed be increased from 600 feet at home and 800 in tropical climates to 1,200 at home and 1,500 in tropical climates; and that a minimum distance of 4 feet between the sides and 12 feet from foot to foot, and as much more as the size of the ward will allow, be maintained between the beds.

"In the construction of new hospitals, we recommend the plan of separate pavilions, with lateral windows on opposite sides, and natural ventilation.

"We recommend the use of Parian cement or other impervious material for the walls and ceilings of hospital wards, in lieu of bare brick or plaster.

"That sufficient provision be made for warming and lighting the hospital according to the weather and season, on the requisition of the medical officer in charge of the ward.

"That water-closets be built in connexion with every hospital, and an efficient sewerage effected by impervious drains not passing under the building, all cesspools in the immediate vicinity of hospitals being done away with, and that the building containing the closets and sinks be cut off from the hospital by a ventilated lobby.

"That suitable lavatories, baths, and laundries be provided.

"That the staircases and landings be in all cases constructed of stone.

"That proper ranges and ovens be put up in the kitchens of every hospital, so that meat may be stewed and roasted as well as boiled, and a sufficient variety in the preparation of food may be afforded to the sick.

"*Returns, Registers, Tables.* We recommend the adoption of a form of monthly diet table, by which the necessity of re-writing every day a nominal list of every patient in the hospital will be done away with. And we recommend that all the regulations affecting the army medical service be revised, many having become inapplicable owing to the changes in the organisation of the War Department, and from other causes. The sanitary directions which they contain are neither numerous nor specific enough, and presuppose a much larger amount of practical sanitary knowledge than is usually possessed by most medical men, either in or out of the army. There are also no means provided whereby any recommendations, however good and appropriate, for securing the health of the troops can be brought into practical application.

"*Statistics.* We recommend that a nominal list of the deceased soldiers, and of births and marriages in the army, be communicated to the Registrar-General at such periods and in such a shape as may be necessary for the objects we have indicated.

"That an improved nomenclature of diseases be adopted in the Army Medical Returns, and such alteration in the classification of diseases as may admit of an accurate comparison of them with other returns of a similar nature; and that provision be made for the periodical publication of the statistics of sickness and mortality among the troops.

"That forms be prepared for the use of the medical officers, which shall enable the commander of the forces in the field to know what is the past and existing rate of sickness and mortality in his army, what are the causes of it, and for what time, at a continuance of the same rate, and with what reinforcements he can maintain his army in the field. These forms should besides enable

the home authorities to compare the rates of the army with those of civil life and with its own rates at previous periods.

"That the household brigade be directed to furnish to the Army Medical Board the same returns of sickness and mortality as the rest of your majesty's troops.

"For the attainment of these objects we recommend the formation of a statistical branch in the Army Medical Department."

In the way of comment on this report, but little remains to be said. The whole is characterised by a broad and liberal feeling, and an earnest desire for the progress of that greatest of all the practical sciences, over which the goddess ΥΓΙΕΙΑ mythologically reigns. There is common sense reiterated in every paragraph, till the grand faculty strikes like absurdity. But while there is little to challenge, the Commissioners, we think, are grievously wrong in one particular, viz., in endeavouring to define too sharply the differences between preventive and curative medicine, *i. e.* in looking on hygienic medicine as a specialty. Into this error they have been unfortunately led by the evidence of one or two of the witnesses who appeared before them, to whose obscurity hygienic principles, as part and parcel of a reformed system of medical education and medical practice, have not yet appeared, and, we fear, never will at this late hour appear in the light of demonstration.

The error to which we here refer is given in page xxi of the report. We quote the passage in its entirety.

"In civil life sanitary science as yet is neither much studied nor widely spread, nor has the value of its practical application to the ordinary conditions of life obtained any very general acquiescence. While the tendency to fuse together the practice of medicine and surgery has thrown almost the whole practice of the country (except that of the great towns) into the hands of the general practitioner, a subdivision of labour of another kind has simultaneously been gaining ground in the medical profession. The study of sanitary science has been taken up as a specialty, and the field has been abandoned by the mass of the profession to be exclusively occupied by those who so study it. The names of those eminent in either branch are perfectly well known to the public, who employ the one or the other according as they want individual sickness treated or public sickness prevented. It is rare to send for the health officer to treat sickness, or to employ the eminent practising physician or surgeon to drain a town, or to guard a district against the approach of cholera.

"The fusion between the medical and surgical specialities is, in the Army Medical Department, even more complete than in the civil profession; and if efficient sanitary officers are to be obtained, it will be by the encouragement offered by Government to the army medical officers to make themselves thoroughly masters of

the specialties of that branch of the medical art and its practical application."

As advocates of the unity of sanitary and curative medicine, we join issue with every sentiment in this paragraph as at once unreasonable and mischievous. We confess that, by mere accident in the progress of medicine, a few estimable Esculapians did, some time ago, isolate themselves from their brethren to become the founders and forerunners of the hygienic reform in physic; but the mission of these men, though effective, has been short. They have not increased as specialists, because their arguments have convinced the profession that the principles they advocated are most exemplary, true in every particular but one, in that, viz. of considering sanitary studies apart from the study of disease at the bedside; eventually, as a class, they will be lost altogether in the universal body which shall accept both curative and preventive medicine in their unity.

This very report, indeed, proclaims the unity we describe. It tells us an all-important fact about the prevalence of pulmonary consumption amongst soldiers, and tells, too, the cause of that prevalence. Is it that this fact shows only how an army may be saved from that disease? is it not, also, that it indicates how a nation may be cured of the disease? For our own parts, and in the name of the largest constituency in this country of sanitary students, we protest against the division of medicine, and for the unity of our science in all its branches. We maintain, on the one hand, that a man ignorant of the phenomena of disease can know not so much as the elements of sanitary science. We affirm, that an immense amount of mischief has been perpetrated by amateur attempts at sanitary pursuits. We assert, on the other hand, without any fear of noticeable contradiction, that whoever assumes to meet disease, and to fight the practical fight with death, without being well grounded in a knowledge of the grand phenomena of life and the general causes of disease,—in other words, without information on the basic points of the sanitary laws,—is one who can only trifle with secondaries, who can see no rational way to treatment, who can but move on, trusting to the ignorance of the world, imposing on himself and imposing on all who may blindly intrust their lives to his unskilful and boastful rashness.

For the rest, we believe the authors of the report are unanswerable in their arguments, and the country owes them a debt not readily repaid for the care, manliness, and industry which have characterised their eventful inquiries.

## PHYSIOLOGY: ITS PLACE IN GENERAL EDUCATION.*

THE publication, in rapid succession, of the popular text-books on Physiology, the titles of which appear at the foot of this page, will be regarded with great satisfaction by all who take an interest in the promotion of sanitary science. The appearance of these works denotes, that the importance of a knowledge of the means of preserving health is gaining general—not, too hastily, to say universal—recognition; for there can scarcely be a stronger proof of the value attached to any branch of knowledge, than that a systematic attempt should be made to place its principles within the reach of all classes, and to introduce them into the instruction of youth.

As sanitarians, we must argue from the practical utility of the popular study of physiology. But there is another argument urged in favour of its pursuit—an argument which we fully appreciate, and which Dr. Lardner enforces in his peculiarly striking language.

"Of all the stores of knowledge", says this author, "there are surely none which should more pique our natural curiosity than those which open to us a view of animated nature. In these we have, so to speak, a selfish interest. So far as relates to our material being, we are ourselves one of the order of animals, among which we hold the highest place. Our organisation includes the most exalted specimen of Nature's work exhibited to us here below.

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* Animal Physics; or the Body and its Functions familiarly explained. By DIONYSIUS LARDNER, D.C.L., formerly Professor of Natural Physiology and Astronomy in University College, London. London: Walton and Maberly. 1857.

Animal Physiology for Schools. By DIONYSIUS LARDNER, D.C.L. With 190 Illustrations. London: Walton and Maberly. 1858.

Atlas of Human Anatomy and Physiology. By WILLIAM TURNER, M.R.C.S. Eng., Demonstrator of Anatomy in the University of Edinburgh. Selected and arranged under the superintendence of John Goodsir, F.R.C.S., L. and E. Engraved and printed in colours by W. and A. K. Johnston. Edinburgh: W. and A. K. Johnston. 1857.

Handbook to Atlas of Human Anatomy and Physiology. By W. TURNER, M.R.C.S.Eng. Edinburgh: W. and A. K. Johnston. 1857.

Man; his Structure and Physiology; popularly explained and demonstrated. By R. KNOX, M.D., F.R.S.E., Lecturer on Anatomy, etc. With eight movable dissected Coloured Plates, and five Woodcuts. London: H. Baillière. 1857.

A Catechism of the Physiology and Philosophy of Body, Sense, and Mind; for use in Schools and Colleges, and in Private Study. By T. WHARTON JONES, F.R.S. London: Churchill. 1858.

Note on Teaching Physiology in the Higher Schools. By HENRY W. ACLAND, M.D., F.R.S., Regius Professor of Medicine in the University of Oxford. Pamphlet. J. H. and J. Parker. 1858.

The Museum of Science and Art. Edited by D. LARDNER, D.C.L. Articles —Air, Fire, the Eye, Spectacles, Man, Instinct, and Intelligence.

In no department of science has so extraordinary a body of knowledge been evolved. In none have results been obtained manifesting in a more striking manner the attributes of the Great Maker of All, than in the provisions made for the maintenance and continuance of the species which inhabit the earth, and for the moral and physical supremacy of man over them. . . . .

"The influence which the study of natural science exercises upon the intellectual faculties merits serious attention. The course of investigation through which the mind is conducted in such studies habituates it to ascend from effects to causes, yet never advancing a step without submitting the deductions of reason to the severe tests of experiment and observation. While such studies lead, therefore, to a habit of lofty speculation, they never permit the imagination to wander, inasmuch as the material verification is rigorously placed in juxtaposition with the speculative hypothesis. This, in a word, like every other branch of natural history prosecuted on just principles, exercises the mind better than any other in those methods of reasoning, without which all investigation is laborious and all exposition obscure." (*Animal Physics*, pp. 1-3.)

To insist on the importance of physiology as a branch of general learning, apart from its sanitary utility, may appear new and strange to many. Yet it is not new. The ancient philosophers—the acquirement of whose language has been made to take the foremost rank in our educational establishments, while their example in teaching practically useful subjects has been nearly utterly neglected—made this study a part of the instruction which they offered to the people. The *Timæus* of Plato is a prominent example of this; in it the structure and functions of the human body are set forth, according to the then prevailing ideas.

But the teaching of any branch of natural science cannot, in the nature of things, be limited in its effects to the mere development of the faculties of the mind. It must have a practical influence on the actions and habits of men:—that is to say (taking physiology as the example), the mere knowledge of the structure and functions of the body, and of the agencies which affect them, must lead all, who possess ordinary reason, to cultivate those influences which preserve health, and to avoid or remove those which injure it. Is it too much to ascribe in great measure to the influence of the popular teaching of natural science by the philosophers, the elaborate care which the ancient Greeks and Romans bestowed on the public health, as manifested in their numerous and excellent sanitary regulations?

The incidental and indirect benefit, then, of physiology as a mere philosophical study would, we believe, be very great.

But our special duty is to point out the good, in regard to sanitary matters, which would arise directly from the diffusion of this branch of knowledge.

Prominent among the advantages that would arise, is the death-blow which would be struck at that power of imposture over ignorance, by which health and life are so ruthlessly sacrificed. Dr. Acland—whom we hail as a zealous and enlightened fellow-labourer—has a few very true words on this subject.

"I look to the increase of a general knowledge of physiology (and of hygiene which it implies) as one of the greatest benefits which will accrue through science to the temporal interests of mankind. Every form of quackery and imposture in medicine will in this way, and in this way only, be discouraged. It is, in great part, on this ground—on the ground of the future benefit to the people through the dissemination of a true perception of the *groundwork* of practical medicine, that I have laboured for many years to promote physiological knowledge in this university, among students holding whatever rank, and destined for whatever occupation." (*Note on Teaching Physiology*, p. 5.)

It is on ignorance, on the want of means of distinguishing truth from falsehood, or certainly from speculation, that the success of charlatans is supported. To a populace possessing a mere knowledge of the existence of the component parts of the human frame, and of their functions, but with little or no idea how these act on each other, or how they are affected by external influences, the extravagances of the quack sound as gospel; and he profits accordingly at the expense of his victims. The acceptance of absurd doctrines in physiology or in any other science is not, we think, due so much to a desire of receiving the doctrines themselves, as of receiving *something* which shall satisfy the natural craving of the mind for knowledge—true or false. Then, in the name of all honesty and common sense, let men's minds be filled with a knowledge of what is true. Let them be taught in simple language what is known, and practically useful, regarding circulation, respiration, digestion, the physiological processes of the body generally. Let them be taught that enough is known to enable men to preserve health, if care be taken not to impede Nature by officious interference. Let this instruction be firmly implanted, and there will be built up a fortification against the attacks of quackery, far stronger and more durable than any which could be raised by prohibitory legislation.

It is not merely as a preventive of charlatanic trifling with disease that a general knowledge of physiology is likely to be

useful. The usages and fashions of our ordinary life are too often adopted without reference to natural laws; and consequently these laws are broken at least as often as they are observed. But the liability to this contradiction of Nature would be greatly diminished, probably altogether removed in time, by a general knowledge of what is incompatible with health and life. If, for instance, the necessity to respiration of allowing a free play of the thoracic apparatus were generally recognised, we should in a little time cease to hear of the mischiefs produced by tightly laced corsets; if the absolute need of a constant supply of pure air for the performance of the same function were known, it would no longer be a matter of popular indifference whether the poisonous gases of the carefully closed and perhaps overcrowded room, or the pure atmosphere, were inspired; if the doctrine of the alternation of repose and activity of organs were understood, less would be heard of overstrained muscle or overworked brain. These examples are merely suggestive, far from exhaustive.

The instances we have given of the benefits which would arise from popular instruction in physiology are general. But there are many special professions, other than the medical, in which this knowledge would find its useful application.

The sanitary condition of the *army* has already been made the subject of special comment in this number of the SANITARY REVIEW; and therefore it is not necessary to say much on the subject in this place. But to what extent the rate of mortality evidently traceable to *preventible causes* might be reduced, were the soldier instructed in the rudiments of physiology, we leave to the judgment of the well informed reader.

The *clergy* have the reputation of being among the most zealous and influential patrons of quackery. The influence which they possess arises in a great degree from the reputation of learning which is attached to them, as a result of their collegiate education. The people suppose their knowledge and judgment to be of universal application; and hence they are accepted as guides in matters on which they have as little correct information as those whom they mislead. The error lies in the system of education which has been generally followed in our universities and schools—a system far behind the requirements of the time. There is, however, a dawn of improvement in this direction, as we shall presently more plainly point out. The study of physiology would be important to the clergy if it only restrained them from doing mischief—if its influence on their actions were merely negative. But this knowledge would also be productive of positive good; for it would enable

them to point out where infringements of natural laws were being committed, and how they might be obviated.

Members of the *legal* profession, especially in the higher grades, are often called on to decide questions involving a knowledge of the phenomena of life. It is true, that they ordinarily call medical evidence to their aid; but of the real value of this, they have little or no idea; and, if it be conflicting, they are liable to be utterly confounded. It cannot, then, be a matter for wonder, that they should sometimes adopt decisions entirely at variance with physiological facts. We say here little of those most abstruse phenomena, the mental functions; although these may, for all practical purposes, be included in our remarks. But, in regard to more obvious and tangible facts, how can a judge decide rightly, in cases where questions involving the several points arise, who does not know, for instance, the phenomena of the absorption of a poison, the circulation of the blood, the nature of the air which we breathe, or the mode in which the process of respiration is carried on? His decision, if correct, must be a piece of good luck; or it must be the result of the laborious exercise of common sense, operating in the midst of confusion, where a little instruction in common physiological principles would have made all clear.

To the conductors of *schools* a knowledge of physiology would be useful, in preventing them from committing many of the absurdities which are practised. In these institutions, especially, we believe, in girls' schools, there is too often a gross neglect of rational principles. As a rule, there is too much restraint of the natural lively impulses of children, while a rigid discipline of "Papa, potatoes, poultry, prunes, and prism", is enforced. This system is absurd and wrong enough in itself; but there are some institutions where the defiance of Nature is carried to a far greater extent. For instance, the American medical periodicals some months ago noticed an instance where, of the twenty-four hours, twelve were devoted to study, seven to sleep, three to meals, and two to exercise. And many are doubtless familiar with instances no less flagrant, in this land, and even in this metropolis of civilisation, where Nature is degraded to the position of a snubbed, ill fed, ill warmed, ill clad maid-of-all-work, in humble attendance, at respectful distance, on gentility. We may be supposed to refer to extreme instances; but we believe that, in general, children in schools are treated rather as machines to be charged with knowledge, than as members of the animal kingdom, living under the same physiological and physical laws as the young of any other species of the organised creation.

The possession of physiological knowledge would be useful to all classes of *manufacturers* and persons engaged in trade. It would give them some guidance as to the means of preventing or diminishing many of the diseases which commonly attend certain occupations, and which raise to a high rate the average mortality among the persons employed. It would teach how the labour must be proportioned to the capacity of the body for its endurance. "National health is national wealth", both generally and particularly; and a healthy body of workmen is obviously far more valuable than a set of semi-animate overworked imbeciles.

Many other examples of the practical application of a popular knowledge of physiology might be given: but the following quotation from Dr. Acland must suffice.

> "General physiological questions will, in a few years, become so universally understood, that much ordinary literature will be unintelligible to those wholly unacquainted with them. Advanced physiological problems are already discussed in reviews, in this and other countries. Sanitary inquiries of all kinds come now within the range of town-councils, vestries, guardians, police, registrars, and officials in every class of society. *Cæteris paribus*, therefore, one versed in such subjects or intelligently grounded in them, is better prepared for office than one who is not." (*Note*, &c., pp. 4-5.)

When and how should the instruction in physiology which is here advocated be given? Obviously the best time for imparting an amount of information, at least sufficient for all ordinary purposes, is in youth. Physiology ought to be introduced as a branch of education into all our colleges and schools, public and private, for the female as well as for the male sex; and if the movement which has begun to be made in this direction receives the support it deserves, the outlines of the science of life will in a few years become as familiar in an educational establishment as the elements of history or geometry. Already we see pleasing signs of this recognition of useful knowledge. For some years past, indeed, there have not been wanting men—among whom the brothers Combe of Edinburgh hold an honourable place—who have laboured to disseminate a general knowledge of physiology. The Society of Arts, also, have endeavoured to promote the study of this science among the members of mechanics' institutes, by enrolling it among the subjects on which they hold annual examinations. The University of London has, from the beginning, required a knowledge of physiology from candidates for degrees in Arts. In the University of Oxford, we learn from Dr. Acland's pamphlet, dated December 1857, that

"In the Grammar School at Magdalen College, the head master, the Rev. J. E. Millard, has permitted the introduction of physiology during the past term as an experiment. An examination was held at the end of term by the teacher, Mr. Griffiths, of Jesus College."

This example is highly creditable to the University of Oxford; and we trust to see it followed everywhere; for it is from the systematic adoption of physiology as a branch of general education that useful results must be expected, rather than from the desultory manner in which this knowledge has hitherto been imparted to the public. Our large public schools will bear much reform in this direction. Even in the Royal Medical Benevolent College, a primary object of which is the education of sons of medical men, and which is chiefly managed by members of the profession, physiology (and, indeed, all natural science) is strangely omitted from the regular curriculum of study, and is apparently as completely ignored as at Harrow or Eton. These great institutions would gain a vast addition to their present reputation by the spontaneous introduction of natural science; that they *must* sooner or later introduce it, will be an inevitable result of the educational movement now in progress.

There are no doubt many objections which may be raised against the introduction of physiology into schools; but none which may not be met. It may be said, that it would be adding to the already overloaded curriculum of education; that it would be in itself an infringement of the physiological principle that the mind (like any other organ) cannot be overburdened without danger. All this might be quite true, if it were proposed merely to superadd physiology to the mass of education at present imparted—if the hours required for healthy corporeal exercise were to be abridged. But what is demanded, is that physiology should occupy a fair share of the time now devoted to the acquisition of knowledge less practically useful, and not at all superior as means of mental discipline.

Again, it may be argued that a knowledge of physiology is necessary only to the physician—to him whose special duty it is to aid nature in repairing the injuries suffered by the body. Without doubt, to the man of physic is requisite the most intimate knowledge which can be attained of the structure and functions of that body, on which, when it is diseased, he employs the resources of his art: but this by no means precludes that every man should know so much of his own mechanism as is necessary for maintaining himself in health. To the physician belongs especially the task of attending to

the repair of a deranged mechanism: to every possessor of that mechanism belongs the duty of preserving it, as he best can, in working order.

Popular instruction in physiology should aim at imparting a correct knowledge of leading facts and principles rather than of details. Dr. Lardner well says:

"It is not necessary to a liberal education to be able to pronounce upon the nice distinctions which separate species from species, nor to trace the course of each artery and nerve which traverses the organs of the body. Such details would encumber the memory of the general student, without leaving upon it any durable or useful traces. The knowledge which is desired is of another kind. The general structure of the human body and its organs; the principal functions by which they are sustained and nourished; the most striking relations between them and the corresponding organs of inferior species: the manner in which the functions are exercised; and the relations between the varying structure of the organs and the habitudes of life of the species to which they belong, constitute knowledge which, once well and soundly acquired, can never be forgotten, and which, while it suffices for those whose pursuits in life do not necessarily connect them with the prosecution of the natural sciences, serves as the base of the special studies of those who engage in professions, with which these sciences are inseparably connected." (*Animal Physics*, p. 2.)

Before concluding, a word remains to be said on the several works which have been enumerated at the beginning of this article.

Of Dr. Lardner's *Animal Physics* we have in a former number spoken in terms of commendation, as a first-class popular treatise on physiology.

The *Animal Physiology for Schools* is evidently an abridgement of the *Animal Physics*, reduced to a size which places the instruction contained in it within the reach of youth, for whom the larger work, excellent as it is for adults, would be too elaborate. The smaller work combines the qualities of accuracy and clearness of description with cheapness in price. The author expresses a hope

"That this volume may be the means of extending instruction in the first notions of Animal Physiology into ladies' schools. . . . In the selection of subjects and in the mode of treating them, the author has kept this constantly in view, introducing nothing which may not with perfect propriety and advantage be brought before the youngest female minds."

We must not omit to say that the book is illustrated with

one hundred and ninety wood engravings: and that at the end of the volume is added a glossary, containing brief explanations of the less familiar terms. We expect that, as the importance of physiology becomes appreciated by the public, this little work will meet with great and merited favour.

Mr. Turner's *Atlas* and *Handbook of Human Anatomy and Physiology* is also a work of much merit, but far too expensive to be likely to come into very general use in schools. Its principal value will be to the teacher, who may, with much profit, use the *Atlas* for the purpose of giving occasional anatomical demonstrations to his pupils.

Dr. Knox's treatise is, like that of Mr. Turner, confined to human anatomy and physiology. It is an elegant book, chiefly remarkable for the manner in which it is illustrated.

"The *Atlas* contains eight plates or engravings representing, as in a medallion or coin, both sides; that is, the direct and the reverse; thus giving to the engraving, in so far as the art can give, the effect of a natural representation. But it also contains other engravings, in which in addition, certain figures have been cut into or dissected, and superimposed, in order to preserve to the eye different layers and different surfaces of the same organ. . . . The layers or laminæ, movable and articulating upon the principal figure, may be raised like the leaves of a book: and the reader may, with their assistance, study the apparatus or assemblage of organs contributing to a function, dissected layer by layer."

Mr. Wharton Jones's intention has been good; but we cannot speak with very high praise of his performance. Indeed, we feel that, as an acknowledged physiologist of excellent repute, he has not on this occasion sufficiently guarded his well earned fame. His *Catechism* is totally deficient in that indispensable adjunct to a popular work on physiology—representations of the things described; for anatomy and physiology cannot be usefully taught by words alone. For our own part, moreover, we object altogether to the system of instruction by catechisms, as one fitted for implanting in the mind of the learner words rather than knowledge, and set phrases rather than ideas.

## ALCOHOL; ITS PLACE AND POWER.*

A TRULY able and temperate work on a subject so prescriptively obnoxious to extreme views as alcohol is rarely met with. We welcome it gladly; and the more so when, as in the present case, it is the production of a writer who is distinguished no less as an authoritative exponent of medical science, than as an earnest and indefatigable promoter of all that can tend to the moral and social happiness of his fellow men. We are not going to discuss the many interesting points involved in the consideration of so important a subject as "the place and power of alcohol"; or to lead the reader through the mazy thread of sophisms employed by the extreme zealots on each side of this much vexed question. Such a task would demand more time and space than we can devote to it: at the same time, we think it only just, both to our author and readers, to state very concisely our own opinions on the matter at issue.

Whenever two sides of a question are diametrically opposed to one another, we think there may generally be found a *via media* between them, which includes many of the arguments in favour of both, whilst it is open to none of the objections against either. And this applies, in our opinion, to the discussion respecting the utility of alcoholic stimulants. The attempt is generally made to force upon us the alternative of total abstinence, or the evils of drunkenness. We decline, however, to accept the proffered Scylla of the teetotallers in exchange for the Charybdis of intoxication; because we feel assured that the safer and more practicable course lies between the two. Nor is this the dictate of a Laodicean policy, or of the irresolute timidity which often instigates the acceptance of a compromise, where the moral courage to adopt the right and more difficult path is wanting.

The results of experience, as well as the researches of science, show most satisfactorily that the moderate use of alcoholic drinks is one of the necessities of civilised life. In all times, and countries, and circumstances, alcohol has asserted its claims to a foremost place in the consideration of the moralist, the legislator, the social economist, and the physician, if not as indispensable to our existence, at least as ministering largely to our health, our enjoyments, and our general well being. Like many valuable agencies, its power for evil is as great, or greater

* Alcohol; its Place and Power. By JAMES MILLER, F.R.S.E., F.R.C.S.E. Glasgow: 1858.

than its power for good; but its capability of perversion no more constitutes an argument against its utilisation, than the destructive influences of fire prevent our employing it for the many purposes of necessity and comfort to which it is subservient. The question of where its usefulness ends and its hurtfulness begins, is another and very different affair; one which every man must to a certain extent determine for himself, and which no one who is honestly anxious to arrive at a truthful result will find much difficulty in settling. To any one who may feel himself embarrassed in this inquiry, not so much from want of will to make a decision at all, as from lack of knowledge upon which to frame it, we heartily recommend this little book of Professor Miller. It is most temperately written; and we are satisfied that the few points upon which we think he has rather overstated his case are more than counterbalanced by the candid, complete, and able manner in which he has treated his subject generally. If he does not always carry conviction, he never outrages reason, like most preceding writers. He has produced an eminently readable and attractive work on a most important topic, and fully deserves the thanks of society.

Though originally intended for Scotch readers, and to meet the wants of a Scotch league, the merits of this little book will secure it a ready appreciation on this side of the Tweed. Whilst it is what it professes to be, "a homely exposition of the matter, and one readily accessible to the popular hand and mind", it is at the same time possessed of qualities which will commend it to the attentive perusal of the medical practitioner, who will find in it many a truth over which he will do well seriously to ponder. As might be expected, coming from the Professor of Surgery in the University of Edinburgh, it is fully up to the present state of science, and bears the imprint of a mind which, though closely occupied by the practical duties of an arduous and responsible position, is yet well acquainted with facts and theories that are far from being "household words" in the literature of the profession. But its greatest merit is the tone of manly independence and honesty which runs throughout it, and which is of much greater importance than mere scholastic erudition, in a book that is intended to circulate largely amongst a class of readers who are frequently unable to detect the sophistry and special pleading so common to works of this kind; an honesty and fearlessness of expression, which those who have had the pleasure of listening to Professor Miller's animated discourses on this and kindred topics, will not fail to recognise as the stereotype of his living words. It is this, conjoined with the peculiar happiness of

illustration which the author possesses, and the frequent brilliancy of language with which he clothes his ideas, that constitutes the great charm of the book, and will, we are sure, cause it to be very popular.

The author treats the subject of alcohol under two points of view: firstly, as to its "place" amongst the ingesta; secondly, as to its "power" upon the body when taken into the blood. We hardly think that the repetition which this arrangement involves is compensated by any gain in the matters of clearness or precision. To us, the "place" of alcohol, as a medicine, as a luxury, and as food, are so intimately connected with one another, that their divorce is impossible. In considering the "place" of a remedy in the *Materia Medica*, we must necessarily take its therapeutic "power" into account; nor can the estimation of the rank which an article of food must hold in a dietary list be a whit more dissevered from that of its effect as a tissue-forming element of the body generally. Upon logical as well as upon scientific grounds, therefore, we object to this division of the subject, into which Professor Miller has probably been led from a desire to assimilate the title of the present work to that of another which has preceded it.*

The general consideration of the properties of alcohol is premised by a brief popular explanation of the more ordinary functions of the body when in health, in which we notice that Liebig's theory of the directly calorifacient properties of the oily and saccharine constituents of food is adopted; and as the same theory crops out in other parts of the work, a few words upon it here may not be altogether amiss. The process of generalising upon facts, and of reducing a large and confused mass of evidence to a few explicit laws, is undoubtedly one of the most useful and necessary duties of the philosopher; but it is one which is very susceptible of perversion, especially in the hands of an imaginative man, or of one who as a populariser of science is anxious to bring down its more abstruse teachings to the level of the ordinary mind. This danger is well illustrated in the theory under consideration. The facts, that the majority of our economical sources of heat belong to the group of hydrocarbons, that oil is commonly burnt in lamps, and that the inhabitants of polar countries are accustomed to indulge largely in the oleaginous luxuries of the table, are considered a sufficient basis upon which to erect a theory: and it is thence assumed that the chief, if not the only, source of heat in the animal economy, is the direct oxidation of the hydrocarbon-

* Abstinence; its Place and Power. A Lecture delivered before the Young Men's Christian Association, December 30, 1856.

aceous matters taken in with the food. Now, if the latter and more exclusive statement of the theory be adopted, it is at once negatived by the fact that the chemist is acquainted with other means of supporting combustion than oxidation. Whenever chemical affinity is exhibited with much intensity, then heat is inevitably given out. We are therefore fully justified in assuming that many other chemical actions which occur in the body besides oxidation are the sources of its heat; though there can be no doubt that substantially this latter process is by far the most important.

The assertion that the direct oxidation of the oleaginous and saccharine constituents of the food is a chief source of heat, or even a source at all, is inconsistent with physiological teaching in its widest acceptation. The researches of Grove, combined with the more recent experiments of Bernard, prove that the heat of the body is derived from the general series of changes or transformations incident to nutrition, rather than from any one chemical result; and that the blood of those organs which perform their duties most energetically, and in which change of tissue goes on most rapidly, is always the warmest. It is not in the lungs, where the oxygen is absorbed, that heat is generated; for their blood is the coldest in the body: it would be as reasonable to say that the bread and meat which go to build up a mason's body also erect the edifice upon which he is employed, as to assert that the oily and amylaceous matters of the food are the only direct sources of that heat which is produced only by the disintegration of the tissues. The probable nature of the process is, that the dynamical force which is exhibited in the motion of the heart and muscles generally, in the circulation of the blood, and in the elective affinities of the tissues for the blood, is converted into its correlative force—heat; just as the dynamical force which we exert when we rub two pieces of wood together is converted into the heat produced by the friction.

The histogenetic importance of oil as an element of the food is now thoroughly recognised; and perhaps ere long we shall be able to say as much of saccharine and amylaceous matters. The researches of Bernard upon the liver have certainly done something towards settling this latter point. But the assertion that these and other hydrocarbonaceous matters serve only to sustain the animal temperature is surely unwarranted. That they do so at all, even indirectly, is only matter of inference; at any rate, we never heard that habitual gin-drinkers were a particularly warm-blooded class of people, which they certainly ought to be, according to this supposition.

We are not, however, unwilling to acknowledge that these substances are *indirect* sources of heat: but we submit that the distinction between the *direct* and the *indirect* value of calorifacients is by no means an unimportant one, as instituting some difference, theoretically, whether we shall tell a man to let a due proportion of these matters enter into the constitution of his food, in order that they may keep him warm; or whether we shall tell him to do so, in order that all his functions may be actively performed, and that, as a necessary consequence, his bodily temperature will never be deficient.

The first light in which Professor Miller considers alcohol is as a "poison"; and so long as he confines his statement to the employment of that agent in large doses, we fully accord with him. But, when he extends his assertion to the action of alcohol taken in "moderation", and condemns any denial of it as "horrible quibbling", as in the following passage, we must be excused if we part company with him.

"Some theorists, indeed, perversely argue, that though alcohol, in large doses, is doubtless poisonous, yet, because it is not apparently hurtful when taken in small quantity, or 'moderation', that therefore it is no poison. The same men may, in the same way, assoilzie every article of the animal and vegetable kingdoms that is brought as panel to their bar. Prussic acid in a full dose will kill you like a shot; but doses of two or three drops of the dilute acid, taken three or four times a day, not only do no harm, in certain circumstances, but even effect a great deal of positive good. Therefore prussic acid is no poison! And so of arsenic. Swallow an ounce, and you die in torture. But in Styria you will be told that it 'actually gives both to horses and men increased vigour, increased beauty, and an enviable rejuvenescence, when taken regularly in minute doses.' *Ergo*, 'horrible arsenic' is no true poison! Is not this horrible quibbling? Arguing thus, you virtually contend for the extinction of poisons as a class. According to your way of it, there can be no true poison. And verily there is none if alcohol be not such." (p. 26.)

It seems to us that the perverse theorists here reprobated are undeniably right. Whatever may be Professor Miller's idea of a "poison", we can form no other definition of it than as a substance which, when taken into the body, involves danger to health or life, by producing a disturbance in the functions of the body; and it is very certain that many articles of common food may act as poisons, when taken in excessive amount, which are perfectly innocuous, and even useful, in smaller quantities, *e. g.* salt, tea, mustard, etc. To take it for granted therefore, that, because alcohol acts as a poison in large doses, it also does so in smaller ones, is only begging the question;

and Professor Miller, in citing prussic acid as an instance of a poison which is beneficial in small doses, is beside the mark: the truth being, that prussic acid is *not* poisonous in small doses; and therefore, when we call it a poison, we must always remember that the term is only predicated of its action in large doses. The word "poison", as Professor Miller uses it, could only be strictly applied to substances which in any quantity, however small, act prejudicially upon the organism, and are *never* attended by beneficial results: in which category alcohol certainly cannot be placed, from his own admission. Alcohol therefore is, or is not, a poison, in the sense in which most people employ the term. If it is, then common salt is equally so; and the force of the term is thereby considerably weakened. If it is not, then the advocates of temperance have one terror the less to appeal to in their denunciations of the evil effects of this agent. We leave them their choice of the horns of this dilemma.

Upon the author's remarks on alcohol as a "medicine" we have little to say: they are admirable, and show that his appreciation of its powers in that capacity is drawn from actual experience. We must, however, take exception to his quotation of the "inflaming patches" on the mucous membrane of Alexis St. Martin's stomach as the results of alcoholic indulgence. The investigations of Dr. Beaumont have shewn that this supposed inflammatory appearance is merely the natural vascular turgescence which is excited by any stimulus whatever, even by common food. And, if the case of St. Martin is to go for anything, it makes against Professor Miller in one point; for Dr. Beaumont places in his catalogue of *vitanda* tea and coffee—drinks which our author especially takes under his patronage.

From "alcohol as a medicine", we proceed to "alcohol as food"; and here we can generally endorse Professor Miller's views. That alcohol is not food is very clear, if by the term food be implied only what goes directly to build up the tissues, and supply by its presence the gaps caused by their disintegration. But, if we extend our definition of food to all articles of ordinary diet that indirectly tend to nourish the body, then the claims of alcohol to rank in this latter division cannot be denied: for, if alcohol is not assimilated itself, it certainly is in many cases a powerful adjuvant to assimilation.

Under the head of "alcohol as a luxury", the author's power of writing, and his command of his subject, are well exhibited; and, as a specimen of his style, we cite the following passage, in which he deals with a very common, and, to say the least of it, a very telling objection.

"In another way I have heard the objection put. 'Beneficent Providence has filled the earth with food convenient for man's natural wants; and has clothed it too with *flowers* to regale and delight his senses. May I not look on wine in this light, and use it as I would a flower, at least occasionally?'

"The earth is fair with flowers—their fragrance is sweet, and their hues are beautiful. But even they are the better of man's hand to restrain and guide; and weeding may be done wisely, too, especially with regard to domestic interests.

"There is a place for every thing. Shut up the most fragrant flowers in a bedroom, and let the sleeper tell what he thinks of their perfume next morning. Literally, he is sick of it; and well he may be, for, through it, he is sick of all things else beside. There is belladonna—a graceful plant, with its dark luscious berries, most fair to look upon. But will you place it by the nursery window, or along the daily walk of your prattling children, who may be tempted to put forth their tiny hands and pluck the deadly poison? Nay: you will leave it where placed by Nature—in the neighbourhood of ruins, in waste places, and solitudes. And there is aconite—beautiful in its spike of deep blue helmeted flowers. Will you think it safe to put it into your garden, mayhap near a bed of the esculent horseradish, for whose root it has so often been mistaken? Better be content with some other ornament, and leave the monkshood to its indigenous mountain sides and wooded hills.

"Flowers are luxuries of the gentlest, as well as of the gayest sort. Many—nay, most—are in all respects harmless when in their proper place. Keep them there. And let those that you have nearest you, and in daily companionship, be both simple and safe; not poisonous, or even in any way hurtful, to yourselves or others.

"And so with alcohol. If you will have a luxury, take not that. Be content with some other, less formidable to you and yours.

Again: What is fairer than the poppy, spread broadcast in the field? As Nature plants and rears it, it is a fit luxury to the eye. But let man, in his cunning device, torture the plant till it yield its juice; and *that* luxury—not for the eye, but for a grosser sense—becomes a deadly poison. So with the grape. What fairer than the vine—its climbing stem, its shady leaves, its gorgeous clusters? 'The fig tree putteth forth her green figs, and the vines with the tender grape give a goodly smell'. The ripened fruit is a 'dainty', both sweet and savoury; and the simple wine of the olden time, though not wholly without its alcoholic and intoxicating ingredient, was not unfitted to gladden the heart of man on occasions of festive mirth. But, as man's 'invention' extorted opium from the poppy, so it brought 'spirit' from the grape. Out of the simple luxuries that God gave him, wilful man has manufactured poisons. Samson's riddle is reversed—out of *meat* comes forth the *eater;* out of *sweetness* comes forth the *strong*." (pp. 67-9.)

In the second division of the book we have the "power of alcohol" fully discussed, as a means of support in mental and

bodily labour, and against heat and cold; as averting and producing disease; as an instrument of vice; and as a special opponent to moral reformation. Under some of these heads there is a slight amount of repetition of matter introduced into the former half of the book; but this was perhaps unavoidable in the division of his subject which Professor Miller has adopted. In the course of looking through this portion of the work, two or three little matters have struck us as of a rather questionable character. The old, and as we had hoped, exploded theory of spontaneous combustion is revived upon the authority of Dr. Charles Wilson. We are told that the habitual toper, "having become, as it were, a compound of an oil and spirit lamp—with a dash of phosphorus to boot—burns with a strange burning, producing little flame or heat (!) but steadily consuming away, in horrid stench, leaving but a small residue of dark and offensive unctuous dross to mark the place where he lay." Such a passage might pass current well enough in *Bleak House*, as a means for providing an easy exit for a personage who had played his part upon the stage and must be got rid of; but surely Professor Miller could not have felt the necessity of such a terror as this with which to point his moral. The drunkard has sufficiently numerous and real dangers to fear without adding to them the questionable contingency of his going off suddenly some day in smoke, 'like a snuff.'

The remarks which the author makes on the nature of the ancient wines are open to more serious objection. When he talks of the wine of the Scriptures as "weak and luscious," and containing "a small (not invariable) alcoholic ingredient;" as being "undeniably weak and fruity;" and when he says that such wines as port and sherry were unknown, he obviously forgets the many instances of the intoxicating power of wine, from the planter of the first vineyard downwards, and that the capability which wine possessed to "make glad the heart of man," must have depended upon the same properties in the earliest times, as in times present.

We had intended to say a little upon the theory of the present day, which regards alcohol as being oxydated at the expense of the tissues, and which Professor Miller seems to accept; a theory which, in our estimation, requires much more evidence to substantiate it than we at present possess. We cannot, however, help remarking, that Professor Miller seems somewhat inconsistent in his application of it. He makes the objection to alcohol, that under its employment the amount of the excreta is diminished, and that the waste matters are

retained in the blood, whilst the disintegration of the tissues themselves is not only not retarded, but absolutely increased. Yet when he comes, a little further on, to eulogise his pet stimulants, tea and coffee, he asserts that they will enable a man to do as much work, and show as little apparent waste, as alcohol will; whilst, unlike it, they do not at the same time prejudicially affect the economy. Now, to use a common phrase, "what is sauce for the goose is sauce for the gander;" if alcohol act injuriously by shutting up the excreting organs, then tea and coffee, if they affect these organs in the same manner, which according to Böcker they certainly do, must be liable to the same objection. The experiments which have been made on these and other accessory articles of diet, to us appear to have been of a too limited nature to allow of our drawing any definite conclusions from them. One thing, however, is very clear, that we cannot have vital actions going on in the body without their being followed by a necessary result of waste of tissue, and consequently of elimination of excreta. Whatever royal roads may be supposed to exist to intellectual operations, there are none to bodily labour. Whatever is bought must be paid for. When a man uses any of his organs actively, he must consume an increased amount of their tissues: and when he consumes his tissues he must get rid of the results of their disintegration somehow or other; if not by his kidneys, by his lungs; and if not by his lungs, by his bowels or skin. That they should remain pent up to any extent in the blood under the use of alcohol, tea, coffee, or any other ordinary article of food, is quite inconsistent with what we know of the serious effects of the retained excreta of the liver and kidney upon that fluid. In such a case a very moderate amount of these drinks would produce most serious consequences to the system, whereas, we know, that they are often taken in large quantities for a considerable time without any prejudice.

In taking leave of our author, we must express the hope, that our having made exception to some points in his work will be taken in good part. We consider his book a very valuable contribution to our literature. The task which Professor Miller has undertaken is a useful and a noble one: we wish him God speed in it with all our heart. Far be it from us to stay his hand in anywise in his onslaught against vicious and unnecessary indulgences. But in his anxiety to convert mankind to virtuous courses, we would have him remember the saying of Montaigne: "Nous pouvons saisir la vertu de façon qu'elle en deviendra vicieuse, si nous l'embrassons d'un desir trop aspre et violent."

# THE EPITOME OF SANITARY LITERATURE.

## SANITARY LEGISLATION AND ADMINISTRATION.*

In this address, Mr. Rumsey reproduces certain of his particular views regarding sanitary legislation. Our readers are already informed as to the manner by which Mr. Rumsey proposes to make this country the paradise of health. They will share with us in our admiration of the enthusiasm and earnestness of the projector, while they look doubtfully on the lines which mark the projection. We presume, however, from the present work, that Mr. Rumsey himself is modifying in his own mind the comprehensive plan for State interference, which he propounded in his essays on State Medicine. On the present occasion he tells us what education, *minus* law, may perform. While talking of comprehensive legislation, he urges that although it would not be desirable to legislate upon all sanitary matters in one session or two, yet "every instalment" of sanitary reform should be part of *one* large and statesman-like project, "so that as the several measures are produced, one by one in judicious succession, when the public mind is prepared for them, they may fit harmoniously together, like the architectural details of some vast pile, planned at one time though reared at intervals, and when completed exhibiting unity of design, and standing in simple grandeur an object for the admiration of mankind."

Mr. Rumsey still opposes (and in this we are not at variance with him) local sanitary legislation. What, he asks, would have been the result of limiting the Poor Law Amendment Act to parishes petitioning for its adoption? He quotes Chalmers, to the effect, that opposition to measures of improvement would in all probability proceed from the very places which most needed those measures. The demand for exemption would be the proof of their necessity. Surely then, thus runs the argument, the application of general hygienic laws ought to be the very last duty of local administration.

But while inclined to modify some of his more extreme views, as to the wisdom, nearly divine, of State intellect, and as to the force, more than mortal, which such surpassing intelligence should put forth for sanitary jurisdiction, the old spirit which entered so largely into the State Medicine essays is still traceable. *Vide*

"It would be waste of words to argue with those who, disgusted with our puny and abortive attempts at sanitary legislation, hastily

* Sanitary Legislation and Administration. An Address. By Henry Wyldbore Rumsey. London: Churchill. 1858.

exclaim against any state intervention, any comprehensive code of public health,—who imagine that all may be left to the wider diffusion of knowledge, and to the unguided exercise of the individual will; but who thus shut their eyes to the history of man, who forget the natural tendency of our race to social degradation—to mental and bodily deterioration, when not upheld by the divine principle of order, and who ignore the proved fact that law and government are indispensable to civilisation. My business is not with such speculators. They must, if consistent, call for the abrogation of every sanitary law in the statute book."

There is nothing more remarkable than the observation how far extreme enthusiasm in one direction will lead the earnest writer. Think, now, that any one should rise and proclaim that the first of the life beings whom the Supreme has led to this earth, has but one natural tendency—*to degrade,* to descend toward the lower tribe of animal. In the name of our common humanity and the grand purposes for which we are each and all formed, we meet this speculative statement with flat opposition, as alike contrary to the natural and divine will and to the facts of history. We affirm, that in the light and radiance of knowledge man, individually and collectively, aspires to the highest position in civilisation; and we repeat what has been said by the personation of the first intellect that has yet visited this planet,—

"Ignorance is the curse of God;
Knowledge the wing on which we fly to heaven."

Again, the idea of trusting to the wider diffusion of knowledge and to the unguided exercise of the individual will, includes, as Mr. Rumsey puts it, a contradiction. If knowledge is widely diffused, the individual will is not unguided, but guided by the knowledge, the strongest of all guides; while the assertion of "the proved fact, that law and government are indispensable to civilisation," embraces only an assumption. That law and government have been coincident with progress is a necessary historical fact. It is conceded; but in the aggregate of history no more is told. Some laws have, truly, by their wisdom helped progress and civilisation; other laws and governments have held back progress for ages, damned knowledge, and blackened humanity. Were the laws against witches indispensable to civilisation? Have the laws which gave origin to the public executioner been indispensable to civilisation? It is a delicate question forsooth how far law, in the main, has influenced mankind for good or for evil. But this is clear, that as laws are out of men and through men, every law can only denote the degree of advancement to which men had attained at the time when such law

was made. *Ergo*, the laws are a sequence. If civilisation is advanced, the laws are indices of civilisation. If the age is gross and barbarous, its laws are like it.

We have so often pointed out what are the legitimate functions of government in reference to sanitary legislation, that we do not dwell on this topic. We believe, with Mr. Rumsey, that a sanitary council of State is advisable. We would give to such council the highest honours. We would give to it certain limited powers for great emergencies. We would relieve it of the ignorant interference of local health legislating amateurs; but we would confine its duties mainly to investigation, recommendation and instruction, on the broad principle that to know the worst is to secure the best. As to the taunt which Mr. Rumsey throws out, that men who hold the opinions we now respectfully offer "must, if consistent, call for the abrogation of every sanitary law on the statute book," we, for our parts, prepared to be consistent, bear it lightly. For as there is not a pure sanitary law in the statute book which in any way comprehensively touches for good any sanitary point, we think, that the sooner the State porridge is strained from its chips, the better for the State.

We cannot, in conclusion, but regret that so able and eminent a sanitarian as Mr. Rumsey should employ his time and thoughts in the wildest speculative schemes of impossible legislation, when he might, by simple teaching and simple scientific investigation, perform in deed that which he now comprises in mere utterances. In the present position of the political forces of England there is, we boldly affirm, an entire want of every element for the construction of a philosophical scheme of sanitary legislation, granting even such scheme desirable. We assert further, that by the time the political element for such philosophical legislation is found, it will not be wanted; since a people, who are so enlightened as to bring together the philosophical law-makers, will have learnt the philosophy for themselves, and taught it to their children, without the aid of either statute-book or statute.

## THE HYGIENIC TREATMENT OF EPILEPSY.*

We notice this work, the production of one of our most accomplished physicians, with much satisfaction. There is a clearness of style, a readiness in description, and a logical manner of argument throughout, demanding the best recommendations we can possibly offer. The chapter on the hygienic

* On Epilepsy and Epileptiform Seizures. By E. H. Sieveking, M.D. London: Churchill. 1858.

treatment of epilepsy concerns us most in this place. Here Dr. Sieveking lays down rules which may be condensed as follows.

Pure air is necessary for the epileptic.

Water as a beverage, and water as a roborant, is necessary to the epileptic.

The food of the epileptic patient, as a general rule, must be nutritious and copious.

Rest of body and of mind exerts a most beneficial influence in epilepsy.

Dr. Sieveking concludes this chapter as follows:

"Frivolous reading books that exclusively excite the emotions, though in themselves of no immoral tendency—but above all books that are calculated to give an improper stimulus to the sexual feelings—from Lemprière, the bane of schoolboys, to *Don Juan* or *Les Mystères de Paris*, the poison of unripe adolescents, should be sedulously avoided. Those abortions of modern civilisation, full-dressed children's parties, which are got up for the sake of pandering to the love of display and vanity of parents much more than for the amusement of the children, must also be mentioned as things specially to be avoided, when the nervous system shows symptoms of unusual sensibility."

We wish that Dr. Sieveking's admirable admonitions were in the hands of every educated man.

### DR. INMAN ON THE PROGRESS OF A RATIONAL MEDICINE.*

Dr. Inman, in the work under discussion, marches in the vanguard of the hygienics. His book has a curious title, for which he frankly apologises. His writing has a meaning which makes up for all misfortunes of title. His views on the progress of medicine are thus expounded:

"When the profession shall have recognised the principles we have attempted to lay down; when they begin to look with jealousy at every dose of calomel, antimony, or digitalis that they order; when they take for a starting-point the axiom that 'disease implies debility,' and 'that everything which weakens a patient must impede his restoration to health;' when bleeding shall have been dismissed to the limbo of scientific fallacies, to be recalled only by some medical judge of supreme knowledge; when blisters become the rifle-shot of the experienced hunter, who never fires without a definite aim, rather than the grape, canister, or the shrapnel-shot of the artillerist, who fires them comparatively at random; when purgatives are not considered panaceas, and salivation is not a refuge for the destitute of ideas; when active treatment gives way to scientific, and the general health is considered superior to the apparent health of any one organ; when medicines

* The Phenomena of Spinal Irritation, and other Functional Diseases of the Nervous System, explained, and a Rational Plan of Treatment deduced. By Thomas Inman, M.D.Lond. London: Churchill. 1858.

are considered as means to an end, and not as so many doses of bottled comfort; when the doctor recognises in recovery the result of a natural process rather than the imbibition of so many ounces of physic; when there is a thorough knowledge of what medicine can do, as well as what it cannot; when a discrimination is made between the effects of a disease and the effect of presumed remedies; when the natural history of each complaint becomes more generally known, not only will the science of medicine be fixed upon a firm basis, but it will command a confidence that it has never yet fully deserved.

"At present, the tendency of medical authors is to hold a magnifying glass before particular organs, to discriminate between the minutest phases of their complaints, and to discuss the best plans of this or that symptom. What is wanted is a broad and comprehensive classification, in which life, health, vitality, and nutrition will form the genera, and diseases the species only. The question the physician will then propose to himself will be, how shall I restore the patient to health? not how shall I attack the complaint? When an organ has gone wrong, or an inflammation has set itself up, instead of punishing the former, and knocking down the latter, the system will be helped to put the one right and to get over the other. A difficulty will be 'tided over' instead of being crushed. Rapidity of cure rather than an ultimate result will be the test of successful theory; and oh! conclusion most disastrous, the more scientific the physician the smaller will be his emoluments."

### THE PREVENTION OF DISEASES OF THE SKIN.*

Mr. Hunt's little handbook commends itself specially to the sanitary student. His concluding chapter is a short but excellent epitome of the general means for the prevention of diseases of the skin.

Speaking of bathing, Mr. Hunt thinks, with due precautions, that either the warm or the cold bath may be employed with equal success. Speaking of air and exercise, he thus writes:

"*Air and Exercise.* Those diseases of the skin, the cure of which is found most tedious and difficult, generally occur in the sedentary class. Shoemakers, tailors, weavers, sempstresses, and artizans of all kinds who work many hours per day in close, confined apartments, often suffer severely, both from general weakness and impaired health, as also from various cutaneous maladies arising from breathing impure air. Yet the remedy is much in their own hands. Most of them reside within easy walking distance of some of the now numerous parks provided for their health. Early in the morning, in the summer especially, for one or two hours before the day's work commences, the air of these parks is as pure and salubrious, and as sweet with the exhalations of leaves

* A Guide to the Treatment of Diseases of the Skin. By Thomas Hunt, F.R.C.S. London: Churchill. 1857.

and flowers as the most distant country park. A walk of three or four miles before breakfast, when once it becomes a habit, gives tone and strength and spirits for the sedentary toil of the day, in a degree incredible to those who never imbibe the sweet breath of morn. Yet the Regent's Park, accessible to tens of thousands, can scarcely count its early visitors by scores; and Primrose Hill is seldom crowned by more than a dozen strollers before the smoke from ten thousand chimneys obscures the view and pollutes the air. I do not hesitate to say that by the morning walk and evening bath a large proportion of the skin diseases of the sedentary might be prevented, the general health of all invigorated, and the mortuary returns of the Registrar-General reduced more sensibly than by all the excellent sanitary improvements now in progress. The early-closing movement may be turned to good account by an evening stroll in the parks; but, as compared with the *early-rising movement*, it is unimportant.

"The morning stroll has other recommendations equally strong, which it may not be deemed an unpardonable digression to mention; I refer to its moral influence. The quiet of the morning invites, almost compels, calm meditation. To the young it offers no temptations. Places of questionable or immoral amusement are closed. The profligate, vicious, and profane are, for the most part asleep, and for a time innocuous and inoffensive; the morning air often exhilarates, always refreshes and cheers the spirits. A gleam of hope, and a sense of peace and tranquillity, if not of contentment and happiness, may beam on the mind, long depressed and fretful, almost as naturally on these occasions as the rays of the rising sun enliven and adorn the scenes of nature."

Speaking of diet, Mr. Hunt tells us that he knows of no articles of diet which ought to be avoided in all skin diseases. As a general rule, he "holds it to be a presumption to prescribe any particular form of diet." The instinct will prove the best guide to the repast.

### EFFECT OF OCCUPATION ON MORTALITY.*

Dr. R. D. Thomson, in his *Report on the Health of Marylebone in* 1856, has the following important notes on occupations and mortality.

"The influence of the peculiar every day duties in which the population are engaged, upon the relative duration of life, is a sanitary question of great import, in reference, not to the inevitably injurious effects of a profession, but to the unnecessary hurtfulness of various parts of occupations as now conducted, but which are susceptible of amelioration. The mortality among blacksmiths in St. Marylebone was as high as 31 per 1000 in 1856; while, in 1851, it was 19 in all England—the total mortality of

* Annual Report on the Health of the Parish of St. Marylebone. Year 1856. By Robert Dundas Thomson, M.D., F.R.S., Medical Officer of the Parish. London. 1857.

males at 20 and upwards, for the whole country, being 20 per 1000. Horsekeepers, jockeys, and grooms died at the rate of 35 per 1000. It becomes a natural inquiry, is this a peculiarity pertaining to the parish, or is it accidental, at the present period? Future observations will tend to throw light on the question; the mortality for the whole of London in 1851, among this class, was 23 per 1000. Shoemakers were affected with a mortality of 17 per 1000, that for the metropolis in 1851, being 18 per 1000; domestic servants had a death-rate of 13 per 1000, the average being 18 for London, showing the favourable position of this class in the parish. The mortality of tailors was 23; of carpenters, 21; of butchers, 20; of bakers, 9, against an average of 18; but there is obviously a great risk in drawing general deductions from the limited data afforded in a single locality, as to the nature of an occupation. More extended results must be compared, extending over a greater period of time." (pp. 5-6.)

### IS THE THAMES PERNICIOUS?*

Dr. Barnes makes the succeeding remarks on the influence of sewerage on the population:

"It is a momentous question, involving perhaps some millions in taxation—to be either wasted or saved—whether the influence of the summer heat upon the waters of the Thames be such as to empoison the atmosphere of London, and so to increase the mortality of the inhabitants? Never before have we enjoyed equal facilities for observing the influence of sewage and of high temperature on the Thames as a cause of disease. The temperature of the Thames has rarely been so high. The quantity of sewage was never so great. The population has vastly increased; and the excreta of many thousands which were formerly received into cesspools, have been, within the last eighteen months, added to the sewage flowing into the river. The eminent engineers appointed by Sir Benjamin Hall to report upon the main drainage of the metropolis, lay it down as an axiom, as the unquestioned justification for gigantic works, and commensurate expenditure, having for their object the 'dispollution of the Thames,'—

"'That the influence of the sewage upon the river is pernicious.'

"In what way the influence of the sewage is pernicious to the river it would be foreign to my duty to inquire. I presume it to be meant 'that the influence of the sewage poured into the river is pernicious to the health of the inhabitants of London.' I will not assert that this influence, if any, is not pernicious to health, but I do most emphatically deny that any definite proof that it is pernicious has been produced. The question and the consequences are too weighty to be decided by declamation or by prejudice. It must be decided by facts. Where are those facts? If the theory be true, we ought to trace the deadly influence of the river. First, and in the severest degree, amongst those who live on its waters.

* Quarterly Report on the Sanitary Condition of St. Leonard's, Shoreditch, for the Quarter ending September 26th, 1857. By R. Barnes, M.D.

Second, in those who dwell near its shores. Third, we ought to find comparative immunity from fever and diarrhœa amongst those who live at a distance from the river. These are points that admit of being determined by observation; by the comparison of the returns of the Registrar-General, and of the weekly register of new cases of sickness, compiled by the Association of Medical Officers of Health. Chemistry and microscopy may indeed prove the existence of a small proportion of living and dead organic matter in Thames water. This kind of proof is all that has been advanced in the elaborate mass of documents that form the appendix to the report of the referees on the main drainage of the metropolis. But to prove the actual presence of this organic matter, is a different thing from proving that it acts perniciously upon the health of the population. The effect of the Thames upon the public health is not to be decided by chemical or engineering science. Nor ought it to be taken for granted. It is a question for medical observation and statistical analysis. The evidence of these has not been called.

"From special opportunities of observing the forms and progress of disease prevalent on the Thames; from careful inquiry into the origin of those diseases; from a comparison of the sickness of the Thames with the sickness of Shoreditch; and from the periodical examination of the water of the Thames under the varying influences of tides, wind, rainfall, and temperature, in which I have been aided by Dr. Odling, the medical officer of health for Lambeth, the conclusion has been forced upon my mind that great exaggeration, if not a total misapprehension, prevails upon the subject of the pernicious influence of the Thames upon the public health.

"I call attention to one fact: since the replacement of the old *Dreadnought* by the present ship, now nine months ago, not a case of fever has originated on board this floating hospital."

## MISCELLANEOUS NOTICES.

From the remaining books and tracts in hand, our space will allow us to notice only a few, and these briefly. Dr. Mackay, in a pamphlet entitled *Notes on the Cholera at Varna in* 1854, gives some striking illustrations as to the contagious character of the great Asiatic malady. Mr. Nourse, in a paper entitled *A Short and Plain History of Cholera, its Causes, and Prevention; written for popular use*, gives in a simple and connected form a very useful history of the disease named. His work may be read by the public at large with advantage. Dr. Murphy has a little work, entitled *What is Puerperal Fever?* We regret that the learned professor propounds the question without attempting to answer it. Dr. Lankester, as Medical Officer of St. James's, Westminster, has issued in a tract a series of *Plain Directions for the Preservation of Health, and the Prevention of the Spread of Contagious Diseases.* Tractarianism is here turned to some real service; for the rules are legible, and the poorest may read.

# ORIGINAL COMMUNICATIONS.

## HEALTH OF THE OFFICERS EMPLOYED IN HER MAJESTY'S POST OFFICE DURING THE YEAR 1857.

By WALLER LEWIS, M.B.Cantab., Medical Officer to H.M. Post Office.

Medical Department, General Post Office, Feb. 27, 1858.

SIR,—I beg to present my third Annual Report on the Health of the Officers of this Department.

NUMBER OF OFFICERS UNDER MEDICAL CHARGE.—As there have been no epidemics among the officers during the past year, the heads of departments and clerks with salaries exceeding £150 per annum, comprised in class A, have not come under my care. Their number was 256.

In class B, comprising clerks and inspectors with salaries not exceeding £150 per annum, there were 293.

In class C, which includes all the other officers in the minor establishment attached to the chief, and Money-order Offices, there were 1375, making in the aggregate 1668 officers under my medical charge.

But so many changes take place in the course of the year, more particularly among the officers of the minor establishment, that as many as 1763 persons have had the privilege of applying for assistance to the medical officer during the year. As a considerable proportion of the officers constituting the difference between the permanent staff of 1668 and the total number of officers who have been temporarily attached, always help to increase the amount of cases of illness, the number may be fairly averaged as 1700 for the entire year.

CANDIDATES EXAMINED.—*Clerks.* During the year, 43 candidates for clerkships presented themselves for medical examination, and of these, three were rejected as unfit.

*Minor Officials.* The number of candidates for the office of letter-carrier during the year was 319. They were thus disposed of:—

| | | |
|---|---|---|
| Appointed | | 168 |
| Found disqualified on examination by | Civil Service Commissioners | 89 |
| " " | Medical Officer | 36 |
| " " | being above age | 10 |
| " " | being under age | 5 |
| Declined the appointment | | 7 |
| Characters unsatisfactory | | 2 |
| Nominations cancelled | | 2 |
| | | 319 |

This shows that, while 11 per cent. of the candidates were rejected on grounds of physical incapacity, 89 of the 257 who presented themselves before the Civil Service Commissioners, or 34 per cent., were disqualified for want of the requisite amount of education.

*Previous occupations of candidates for Letter-carriers hips.* Observing that a large number of the candidates who present themselves for medical examination, are small, slightly made, and sickly looking, I have obtained information of the previous employments of the last 329.

They were as follows :—

| | |
|---|---|
| Domestic and other servants | 60 |
| Porters and messengers | 38 |
| Clerks in counting-houses, etc. | 20 |
| Schoolmasters | 2 |
| Farmers and labourers | 10 |
| Soldiers and sailors | 14 |
| Workers in metals | 11 |
| Grocers | 13 |
| Tailors | 14 |
| Drapers and shopmen | 13 |
| Painters and plasterers | 9 |
| Shoemakers | 7 |
| Butchers | 9 |
| Bakers | 7 |
| Gardeners | 9 |
| Policemen | 5 |
| Booksellers, printers, etc. | 6 |
| Weavers | 3 |
| Carpenters and packers, etc. | 6 |
| Druggists | 3 |
| Tobacconists | 2 |
| Fishmonger | 1 |
| Publican | 1 |
| Coiner at Mint | 1 |
| Doll maker | 1 |
| Pipe maker | 1 |
| Milkman | 1 |
| Sand dealer | 1 |
| Moulders, furriers, and leather cutters | 7 |
| Unknown | 54 |
| | 329 |

It will be seen from this list how small a proportion of the letter-carriers, sorters, and stampers, employed in the department, is derived from agricultural labourers, or from persons who have been accustomed to healthy out-of-door employment. The large proportion of domestic servants, clerks in counting-houses, tailors, drapers' and grocers' assistants, and other shopmen, accounts for the generally debilitated and under-sized condition of the present class of candidates. I am informed by officers who have known the department for many years,

that formerly a very different class of persons presented themselves for employment as postmen. Many agricultural labourers, and others of strong muscular development constituted the general run of applicants, whereas, for some few years past, these are the rare exceptions.

The consequence of this state of things is, that there is more illness among the officers than the nature of their work might be expected to give rise to. That the occupation of the men employed in the minor establishment is by no means necessarily injurious to health I have shown in a special report on the domiciliary condition of the men. Instances are there given of officers who have been actively employed in the service for periods varying from thirty-five to forty-six years. During the last ten years seven men have left the service, all of whom had been employed as letter-carriers for more than half a century: and in the course of the last five years nineteen men have quitted the department, who had served between forty and fifty years. But though the work is not detrimental to men of average constitutional strength, and of fair muscular development, and with sound organs of breathing and circulation, it is quite the contrary with persons of impaired health, or who are undersized in stature or weakly framed. I have therefore proposed that his Grace the Postmaster-General should sanction the medical officer rejecting as unfit for the work, not only such candidates as are actually labouring under disease, but also such as are not found by certain specified tests equal to a stated amount of corporeal exertion. The injury done to candidates themselves, by admitting those that have delicate lungs, is shown by the subjoined tables of mortality. It will be seen that out of twenty deaths in the department, including clerks, ten, or exactly half, have been victims of consumption.

That this is a very large proportion of deaths from this disease is proved by the fact, that while the total number of deaths in the city of London during the year 1857 was 2942, but 356 of that number, or less than one-eighth part, were caused by phthisis. Very nearly the same proportion obtains for the whole metropolis, where, on an average of seventeen years, the deaths from decline were 13·173 to every 100 deaths. Of the deaths from all causes of persons aged twenty years (which is about the average age at which persons enter as officers of this department) and upwards in London, the proportion of those dying from phthisis is 18·1 per cent. on an average of the three years 1853-55.

In all of the ten fatal cases, whose history during life I was enabled to investigate, the disease proved to be hereditary,

showing, that if proper care had been taken on the application of those officers for admittance while candidates, the greater number, if not all of them, would have been rejected. All of these officers had been in the department for some years previous to the appointment of an examining medical officer. I am sorry to state that there are still on my list numerous patients, (a very large proportion of whom are Irish), suffering from this fearful scourge, all of whose days are numbered, and who will, for some time to come, help to swell inordinately the annual list of deaths. In my opinion, the utmost strictness should be used in excluding, not only such candidates as are actually, at the time of presenting themselves, suffering from this complaint, but also such as show a strongly marked tendency thereto, especially when this is combined with a weak frame of body. The average age of the consumptive patients, at the time of their death, was 29.

General Health. The diminution in the number of cases of illness and in their duration, proves that the general health of the whole establishment has been good. Compared with the year 1856, the past year exhibits a favourable contrast, notwithstanding an increase in the general mortality. In the year 1856, among 1500 officers there had occurred 1771 cases of illness, or 118 per cent., while during the past year, among 1700 officers, being an increase of 200, there have been but 1403 cases, or 82 per cent. This shows a diminution of 36 per cent. of sickness in 1857 compared with 1856.

The following table shows the number of clerks and other officers who presented themselves for official medical assistance during the year 1857, specifying some of the more common complaints :—

TABLE I.

*Sickness during the Year* 1857.

| Months. | Clerks | Others. | Total. | Diarr. | Rheumatism. | Boils. | Sore throat. |
|---|---|---|---|---|---|---|---|
| January . . . . . | 10 | 110 | 120 | 3 | 10 | 3 | 5 |
| February . . . . | 15 | 118 | 133 | 6 | 7 | 5 | 1 |
| March . . . . . | 6 | 96 | 102 | 4 | 9 | 4 | 7 |
| April . . . . . | 4 | 84 | 88 | 3 | 5 | 2 | 5 |
| May . . . . . | 13 | 87 | 100 | 6 | 8 | 3 | 9 |
| June . . . . . | 15 | 107 | 122 | 20 | 5 | 5 | 3 |
| July . . . . . | 21 | 133 | 154 | 63 | 7 | 5 | 7 |
| August . . . . . | 17 | 144 | 161 | 66 | 9 | 5 | 2 |
| September . . . | 16 | 106 | 122 | 21 | 9 | .. | 5 |
| October . . . . . | 8 | 106 | 114 | 13 | 11 | 3 | 1 |
| November . . . | 19 | 85 | 104 | 6 | 3 | 2 | 5 |
| December . . . | 7 | 76 | 83 | 4 | 9 | 1 | 5 |
| Total . . . . | 151 | 1252 | 1403 | 215 | 92 | 38 | 55 |

524 visits were paid to officers at their own houses, when too ill to attend at the office. I also visited officers at York, Derby, Rugby, and Newcastle, who had met with injuries in the execution of their duties.

Epidemics. There have been no special epidemics during the year. Sixty-two branch and district offices have been supplied with medicine for the immediate and efficient treatment of the usual summer and autumnal diarrhœa, so frequent among the letter-carriers. By means of careful directions to the charge-takers and inspectors at the various offices, great numbers of the men have been relieved at once, and in most instances they have been enabled to continue their duties uninterruptedly. Upwards of 250 gallons of the medicine have been thus dispensed.

Average duration of Illness.—*Clerks.* One hundred and fifty-one clerks presented themselves at the office for treatment during the year. This number includes a few in class A, who were labouring under diarrhœa. The total number of heads of departments, clerks, inspectors, etc., comprehended under classes A and B, who have been off duty from illness, is 465, and the total amount of such absences is 4,919 days, making an average of ten and a half days each.

If nineteen of these cases, however, (some of which were absences not really caused by illness, seven ending in retirement from the department, and the rest being followed by dismissal), which have each exceeded three months in duration, and have engrossed between them 2,328 of the whole number of days, be deducted from the gross amount, the mean average duration of each case of illness among those clerks who were absent, will be about five days and three quarters.

*Minor Establishment.* The total amount of absence from duty in days, on account of illness in class C, was 12,888 days. This will give a mean average duration of ten days for each officer who absented himself. But this amount of absence is unduly swollen by the prolonged absence of twenty-one officers who have been away 2875 days. As none of these will return to the department, and their places have been filled up by fresh appointments, their absence should be deducted from the gross amount. The average duration of each case will thus be reduced to about eight days. But a large proportion even of this reduced amount of absence is caused by few cases. Fifteen officers have been absent many months consecutively, one for more than eleven months.

*General body of Officers.* Of the 2019 officers who have been attached to the chief and Money-order offices during some

portion of the year, 892 have been at some time absent from duty on account of illness. The average number of days that any officer was off duty from this cause, including in the calculation the whole body of officers, was about ten days. But if correction be made for the forty exceptional cases above alluded to, the average total absence will be six days and two-thirds. In other words, every officer in the department has, on the average, been absent from duty nearly a week on account of ill-health.

DEATHS. These are represented in the two tables subjoined.

TABLE II.

*Deaths during the Year* 1857. *Clerks, Inspectors, etc.*

| Disease. | Age at Death. | | | |
|---|---|---|---|---|
| | 30 to 40. | 40 to 50. | 50 to 60. | Total. |
| Consumption . . . . . | 3 | .. | .. | 3 |
| Inflammation of bladder | .. | .. | 1 | 1 |
| Typhus . . . . . | 1 | .. | .. | 1 |
| Total . . . . . | 4 | .. | 1 | 5 |

As these five deaths took place among a body numbering 549, it follows that the mortality among the heads of departments, clerks, inspectors, etc., was at the rate of 9 per 1000.

TABLE III.

*Deaths in Class C.*

(*Letter Carriers, Sorters, Messengers, Stampers, Porters, Labourers, Firemen, Constables, and Female Domestics.*)

| Disease. | Age at Death. | | | | | |
|---|---|---|---|---|---|---|
| | 20 to 30. | 30 to 40. | 40 to 50. | 50 to 60. | 60 to 70. | Total. |
| Consumption . . . . . | 1 | 1 | 5 | .. | .. | 7 |
| Inflammation of brain . . | 1 | .. | .. | .. | .. | 1 |
| Acute rheumatism . . . . . | 1 | .. | .. | .. | .. | 1 |
| Bronchitis & emphysema | 1 | .. | .. | .. | .. | 1 |
| Abscess of liver . . . . . | .. | .. | 1 | .. | .. | 1 |
| Disease of heart . . . . . | .. | .. | 1 | 1 | .. | 2 |
| Mortification of leg . . . . | .. | .. | .. | .. | 1 | 1 |
| Cancer of jaw . . . . . | .. | 1 | .. | .. | .. | 1 |
| Total . . . . . | 4 | 2 | 7 | 1 | 1 | 15 |

The number of officers among whom these fifteen deaths occurred being 1375, it follows that the mortality during the year was rather under 11 per 1000. The average mortality for the two years 1856 and 1857, taken together, amounted to

9 per 1000. I have compared this rate with the mortality in the same class (C) in each of the three years 1851, 1852, and 1853, omitting the year 1854, as it was a year during which epidemic cholera existed in London. From the statistics furnished to me, it appears, that those three years show the following mortality per 1000 :—

| | |
|---|---|
| In 1851 - - - | 14·5 |
| 1852 - - - | 18· |
| 1853 - - - | 12·3 |

How far the very considerable diminution in the number of deaths in the two years just elapsed may be due to keeping a stricter surveillance over the admission of candidates than was practised before an official medical authority formed part of the staff of the department, and how far that improvement is due to other sanitary causes, it is impossible to state with any approach to accuracy.

OFFICERS RETIRED FROM THE SERVICE, AND PENSIONED. During the year, forty-six officers have been superannuated; and thirty-two have been dismissed for bad conduct.

On the 31st of December, 1857, the number of officers receiving pensions for former services in this department was 225, exclusive of retired country postmasters, and officers who had been attached to the packet service. There had been fourteen deaths during the year among the superannuated officers ; a mortality of six per cent.

If a calculation of the total mortality, both among the efficient and non-efficient branches of the department, for the year, be now made, the numbers will stand thus :—

| | |
|---|---|
| Number of officers in Class A. - - | 256 |
| ,, ,, B. - - | 293 |
| ,, ,, C. - - | 1,700 |
| ,, retired officers - - | 239 |
| | 2,488 |

among whom thirty-four deaths took place, a mortality of rather less than 14 per 1000.

These figures contrast favourably with the returns which the Registrar-General has transmitted to me for the three years 1853-5. From these, it appears that the annual average mortality in London of males aged twenty and upwards, is 24·2 per 1000.

The rate of deaths among the officers on active service being just 10 per 1000, while that among the superannuated officers was 60 per 1000, it follows, that the mortality was six times as great among the non-efficient, as among the men doing active duty.

*Age of Superannuated Officers on Retirement.* The officer on the present list of pensioners who retired earliest in life, was but twenty-eight years of age when he left the service; and the oldest did not leave till he had passed his seventy-seventh year. The average age of the officers at the time of their retirement was fifty-five.

*Length of Service.* One clerk, (the officer above alluded to as being but twenty-eight years of age on retirement), was allowed to leave on account of incurable disease, after only nine years' service; while several served fifty, and one more than fifty-one years, before applying for superannuation. The average length of service before retiring was nearly thirty years.

*Present age of Annuitants.* The ages of retired officers on the 31st December last, varied from twenty-eight to eighty-four. Their average age was fifty-nine years and three-quarters.

*Former status of retired Officers.* Of the 225 superannuated officers surviving on the 31st December, 1857, 53 had been heads of departments, clerks, inspectors, and other superior officers, while the remaining 172 were letter-carriers, messengers, sorters, and mail-guards.

*Causes of retirement.* The causes of retirement may be thus arranged :—

| | |
|---|---|
| Age, general debility, and broken-down constitution | 93 |
| Impaired vision | 24 |
| Diseases of brain and nervous system | 18 |
| Chronic rheumatism | 14 |
| Diseases of the lungs | 13 |
| „ heart | 13 |
| Rupture, etc. | 10 |
| Injuries received in the service | 5 |
| Ague | 1 |
| Diseases of the liver or kidneys, deafness, lameness, or other infirmities | 25 |
| Abolition of their office | 6 |
| At petitioners' own request, having completed 50 years service | 3 |
| | 225 |

Removable Causes of Disease. In my last annual report I stated, that the passages and hall on the secretary's side were extremely cold and draughty during the winter season, and I recommended that a fireplace or stove for warming the ascending air should be erected at the bottom of the grand staircase. This has been done, and I have reason to believe that it has had all the good effect anticipated from it. Complaints of colds and attacks of rheumatism from the officers on that side have been much less frequent this year than formerly.

With the exception of the draughts of cold air, which in the winter very much incommode officers doing sorting duties in some parts of the inland and newspaper offices, and which, from the construction of the building itself, are very difficult, if not impossible, wholly to get rid of, without interfering with the dispatch of public business, most of the removable causes of disease to which the men are exposed, are to be found in the insalubrity, the ill-ventilated, undrained, overcrowded, or confined condition of their private dwellings, with which, of course, the medical officer has no power to interfere except by way of advice.

One among many examples may be mentioned, of a letter-carrier whom I attended for disease of the lungs. I found him, with his wife and child, sleeping in a close room, or rather box, measuring six feet in length, five in width, by eight in height. This gives an amount of only 240 cubic feet of air among the three, iucluding the space occupied by the furniture, whereas there should be at least 2000 cubic feet. There was no window or fireplace to the apartment, if such it may be termed. The only mode by which it was supplied with fresh air, was a broken window adjacent to the door, and to which I attribute his very dangerous illness. It should be borne in mind, when estimating the injurious effects of living in overcrowded, or in close, unventilated rooms, that the mischief is by no means entirely owing to the absence of the oxygen and its replacement by carbonic acid gas. Animals kept in a limited space, where the normal chemical constitution of the atmosphere is kept up by the absorption of the carbonic acid gas as soon as formed, and the substitution of oxygen, nevertheless quickly die from the effects of the gaseous and other effete matters thrown off from the lungs and skins of their own bodies.

Ventilation of the Buildings. I have approved of a plan for ventilating the chief office, suggested by Mr. Cowper, C.E., which we hope will supply all the offices with a sufficient amount of fresh air, without causing draughts. If this very difficult object can be attained, I have little doubt that the health of the officers in general will be greatly promoted thereby. As the plan has received the sanction of the Lords of the Treasury, and the necessary instructions have been given to the Clerk of the Works, I hope it will be in full operation by the ensuing summer.

Provincial and Country Offices. In addition to suggestions for the improvement of different rooms and offices connected with the chief, money-order, and branch offices in

London, all of which have been attended to, and the recommendations carried out, during the course of the year I visited the following offices, some of them by special request of his Grace the Postmaster-General, and made reports as to their sanitary condition :—Edinburgh, which is about to be abandoned as soon as a new office can be erected, Glasgow, Liverpool, Manchester, Cardiff, and Bristol.

I have the honour to remain, Sir,

Your obedient servant,

WALLER LEWIS, M.B.Cantab., F.G.S., etc.

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## INJURIOUS EFFECTS OF UNDERGROUND KITCHENS.

By FREDERICK J. BROWN, M.D., Chatham.

THE proper construction of dwelling houses is a matter of great importance to the public. The requisite conditions are salubrious site, dry foundations, efficient drainage, spacious apartments, and direct communication with the open air, so as to ensure thorough ventilation.

There is another condition, which is not generally noticed by writers ; it is this : that the basement story should be used only for cellar purposes, and not be divided into kitchens. The reasons are two-fold ; namely, (*a*) the darkness and damp to a certain degree inseparable from subterraneous apartments ; and (*b*) the exhaustion occasioned to those that occupy such kitchens by the frequent ascent and descent of stairs.

First, as to the effects of darkness and damp on the human body. Light is requisite to the colour, firmness, strength, and vigour of the body, and to the activity and cheerfulness of the mind. The more abundant the light, and the more direct that it is from the sun, the more decidedly are these good effects experienced. Light that is reflected has different properties from that which is direct. The actinic properties of sun-light are lost by reflection. Thus light that is reflected from a wall has but little value, compared with that which shines into a room direct from the broad face of heaven. The direct rays of the sun, then, are necessary to bodily and mental vigour. Those that live deprived of the sun's rays, feel a craving for stimulants such as is not experienced by those dwelling on open lands. Damp earth withdraws from the body its normal proportion of electricity, and thus occasions disorders that depend upon diminished nerve-force. These are ague, neuralgia, certain forms

of rheumatism, epilepsy, chorea, and asthma, with some other affections, such as dyspepsia.

The servant-girls of London exemplify remarkably well these evil effects of damp; also the injurious results of deprivation of the solar rays. Their etiolated condition, and their breathlessness, show the anæmia (the impoverished state of blood) under which they suffer; and the functions peculiar to women are carried on imperfectly, or are absolutely suspended: hence the headache, the pains in the side, the palpitation, and the dropsical ankles, so frequently witnessed in this class. These circumstances are well known to the profession, and are especially familiar to those members who practise in the metropolis. Organic disease of the heart is originated by these causes in some instances.

The unhealthiness of underground tenements is shewn by the statistics of the city of Liverpool; the subterranean inhabitants being in a much worse sanitary condition than the supraterranean population.

Thus, then, the effects of darkness are disease, and not merely delicacy of structure; and the morbid condition is aggravated by the damp that is associated with the darkness.

(*b*). The next consideration is the exhaustion attendant upon the frequent ascent and descent of stairs. The necessity of answering the front door, and of ascending to the upper part of the house in the performance of domestic duties, obliges the servant to undergo much fatigue in running up and down stairs. The carrying of a burden up stairs is attended by a very much greater expenditure of strength than is the case in carrying it along a level. Girls that are breathless, owing to their anæmic condition, and oftentimes dropsical about the ankles, cannot afford the increased exertion that the circumstances necessitate: it is torture to them.

The value of land in London causes houses to rise vertically rather than to increase in dimensions horizontally. The same reason, namely, high value of land, is slowly but surely operating on the style of building in country towns. It will inevitably, if persisted in, bring about an approximation in the death-standard between the towns of small size and the great urban populations of this country.

It is the duty of physicians to point out the evil effects of subterranean apartments, and to impress upon the minds of builders, and upon the public generally, the injurious consequences of damp, dark kitchens, so placed that a multiplicity of stairs must be used in the performance of daily domestic duties.

In provincial towns, the wives of artisans and others of the working classes, occupying houses with basement kitchens, suffer much from exhaustion due to the necessity of frequently ascending the stairs. A woman gets up from her confinement pale and weak, from want of generous living, and perhaps, also, blanched by hæmorrhage: she is obliged to go up and down stairs some score of times in the day, and the consequence is a prolonged convalescence, with palpitation and other distressing symptoms, and sometimes even displacement of organs such as the womb.

Besides these ill effects upon women, the children are apt to meet with accidental falls down the stairs, and to harass their mothers by the watching necessary to prevent such accidents. Darkness and damp produce unfavourable effects upon growing children; and scrofula, and rickets, and consumption, and swelled bellies, are the result.

In the name, then, of humanity, let a stop be put to this sepulture of human beings, and to this treadmill exercise of women rendered weak and blanched by their premature interment.

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## EPIDEMICS AND THEIR EVERY DAY CAUSES.

By W. I. COX, M.R.C.S.

I PROPOSE, in the present paper, to call the attention of the readers of the SANITARY REVIEW to some of the many deleterious agents which prevail in numerous localities, as bearing on the development and diffusion of epidemic disease.

The influence of the various seasons of the year—of atmospheric and terrestrial electricity upon the human organism—the effect of the electric tension on the production or prevention of disease—the geographical conditions of epidemics, and the meteorological states which are generally found associated with the outbreak of pestilences—all these are unquestionably subjects, the importance of which it would be difficult to overestimate, and which well merit the most diligent and patient investigation. But, up to the present time, they remain, as ever, shrouded in doubt and incertitude. They are too much *in nubibus*, too remote, to be available for practical application. It is not so with the matters I am now about to discuss. For, if chemical and physiological science has proved anything, if it has succeeded in placing any fact in an unassailable position,

it is the following;—that animal and vegetable emanations are a fruitful source of zymotic disease; that these noxious agents operate as causes in regard to the whole class of epidemics; that what will in one place develope the exciting cause of typhus, will in another produce scarlatina, small-pox, or cholera. In fact, medical men, who practise much among the poor, can generally, when any epidemic is impending, predict with tolerable certainty the localities where it will appear; where its type will assume its greatest malignity; where its victims will be most numerous, and its mortality most deplorable. If this be true, and we find on inquiry that these noxious agents exist and flourish unchecked and unheeded in too many places amongst us; that in such spots the *materies morbi* is never absent, but that there is kept up a perpetual hot-bed, so to speak, ready at all times for the reception and growth of the fatal germs of zymotic poison; we must surely admit that these aforesaid predisposing and developing causes of disease are far more important to us than the proximate cause; and that it would be much more advantageous and expedient to direct our attention to remediable and removable influences, which can be shewn to exercise so vast a power over the spread of pestilence, than to bewilder ourselves with abstruse speculations concerning the absolute essence of zymotic poison, or the laws of its aërial passage from clime to clime: things which, even if comprehended, would doubtless remain evermore as far removed from the sphere of our control as the law of storms, or the velocity of the tidal wave.

If the non-professional reader ask, Do these hurtful agents still exist, and in number and force to justify a crusade? statistics from a hundred sources, parliamentary and medical, cry out a loud affirmative. They show that, in numerous localities, the poor are crowded in stifling dens, wherein the rich would not consent to keep their domestic animals; that in hundreds of places they are compelled to drink poisonous water, instead of the pure element which God gave for the use of men and beasts; that dirt, misery, ignorance, and depravity, reign supreme in scores of densely populated cities; and that the baneful gases, which constitute the *pabulum* of zymotic poison, are constantly being generated and concentrated in the homes of thousands in our favoured isle.

Statistics further show us, that epidemics ravage only those districts wherein there are *endemic* influences at work. Now these epidemic agents it lies within the scope of human power to lessen and remove.

I divide these local agents or causes of disease into two

broad classes; 1. Those of a physical, and 2, those of a social or moral origin.

Under the first head, I shall consider,

1. Overcrowding.
2. Defective drainage and ventilation.
3. The use of foul water.
4. Privation of solar light.

Under the second division, I shall have to speak of,

1. Intemperance.
2. Filth.
3. Neglect of infantile life.
4. Unhealthy occupations.

### I. OVERCROWDING.

The poisoned atmosphere produced by the aggregation in close rooms of an excessive number of human beings, is one of the most influential agents in developing disease. Its pernicious qualities are not due alone or chiefly (as is very commonly supposed) to the increased amount of carbonic acid gas. They are attributable to a still more formidable agent, viz., the presence of effete organic matter, thrown off from the lungs and skin. This effete body is an albuminous compound in a state of rapid decomposition,* whence results the liberation of hydrosulphuric acid, and other noxious gases. Do not let us be deluded with the idea, that the miseries and evil results of overcrowding are confined to great cities, or towns of third and fourth-rate size. I have frequently encountered them in obscure and petty country villages, where are to be found ill-built, close, stifling cottages, and low lodging-houses, crammed to excess each night with human beings. The consequences are not less fatal to the health and morality of the inhabitants of such dwellings, than to those of densely populated towns. Evil is assuredly evil, find it wherever we may. As regards the moral enormities which result from such an abominable system (and which re-act, in their turn, on the physical constitution, by means of the recklessness and degeneracy they occasion) who can wonder at these? Where human creatures are shut up at night in the same fold, like the beasts of the field; with no distinction of sex—males and females, with no other tie between them than the link of a common nature, a common appetite, occupying the same stifling chamber, the same filthy and polluted couch—we cannot wonder at the revolting scenes which are sometimes brought to light.

* Experiments, which cannot of course be detailed in this place, have abundantly proved to me the truth of this assertion. They entirely confirm the results of those instituted by Dr. Angus Smith.

I will now proceed to give a few examples of the connection of overcrowding with the development of typhus, scarlatina, and cholera. I am aware that, in statements of this nature, it is necessary most carefully to guard against the philosophical empiricism of hasty conclusions from insufficient evidence. Many writers have traced, as they thought, a malady to its source, but have merely exhibited striking examples of causation, hastily and erroneously inferred from casual conjunction. This error will now be avoided as far as possible.

*Typhus.* In December 1848, and January 1849, I had the care of the sick poor in the northern district of the Poplar Union. No fever cases (excepting in two or three scattered instances) had occured in the district, I was informed, for two years previously—either in the town of Bow, or the adjacent village of Bromley. Two recently built streets (or rather parallel rows of houses) in the latter place became occupied with Irish families during the previous summer. As respects drainage, water-supply, and general arrangements, these streets were quite on a par with the rest of the village. About the middle of December typhus, of a very low type, appeared in three houses almost simultaneously, in the lowest of these streets. (They ran parallel to each other, being situated on a slight declivity). In an incredibly short space of time it had swept through both of them. The medical practitioner who had charge of the district was seized with the malady in its worst form, and died comatose in ten days. I then entered upon the duties. On the 8th of January, not a habitation in the lower street but had at least two of its inmates "down" in the fever; and in the upper street I had also twenty-eight fever cases under my care. In many of the houses two of the in-dwellers were lying comatose; and in four of these habitations, three persons in each were attacked at the same time. In all, fifty-three cases of fever occurred within the limits of these two streets between the middle of December and the beginning of March. The disease did not extend to the rest of the village, neither did it break out elsewhere within the district. Only one case occurred at Bow. This was in the person of a young woman, who, returning home from distant service in the commencement of February, stayed a few days with her parents, who lived in one of the streets above described; and afterwards went to reside at Bow, in the service of a respectable family, whose dwelling was dry and airy. She was seized with the fever the day after her removal. Now what was the state of things in these houses? The overcrowding was awful. Each house consisted of four rooms,

about twelve feet square. An entire family lived and slept in each chamber. In one, I counted seven human beings, who occupied the same filthy couch—a father, mother, three adult daughters, and two younger children! In a second room, six persons slept, viz., a widow, her two grown-up daughters, an adult son, and two young children! There were two beds, it is true, but no partition or curtain between the sexes. A third room contained five—a fourth the same. Not to tediously repeat the same fact, one room in any of these houses was a fair specimen of the whole. It is unnecessary to say, that they were indescribably foul, fetid, close, and disgusting.

In the above instance, we can have no hesitation in ascribing the concentration and severity of the fever-poison (if not, indeed, its actual development) to the vitiated atmosphere produced by the overcrowding. I made every inquiry, but was quite unable to trace the origin of the disease to any other source.

Whilst in Lancashire in 1855, the incumbent of the district adjoining that in which I resided, called my attention to the following fact. A lone cottage in his parish had been visited by fever of a low type every winter for some years past, carrying off, on each occasion, at least one of the inmates. No cause, he said, could be assigned for the visitation; nor did the disease prevail in the neighbourhood at such times. The cottage was provided with tolerably good drainage, and the character of its indwellers was that of average sobriety. "In short," this gentleman concluded, "I fancy you sanitary men would find yourselves at fault here for once." I visited the place with some curiosity. The house was a thatched cottage, very low-roofed, and with exceedingly small rooms; especially the bedrooms, which were not quite nine feet square by six feet in height. There was no cause for censure on the part of cleanliness. A middle-aged couple and one adult* son were the only inmates at the time of my visit (during the summer). But on inquiry, I discovered, that during the winter months they took in, as lodgers, a number of young men, varying from five to eight; and that these were all packed at night, with the son of the host, into the two small sleeping apartments just mentioned. So that four and sometimes five grown-up men were in the habit of sleeping, for months in succession, every night in a room containing about 480 cubic feet of air; having no fireplace, and no "practicable" window. These men left in the spring to procure agricultural employment at a

* Another younger son had died of the fever the previous winter.

distance. Here was, to me at least, a sufficient solution of the apparent mystery.

In another village in Lancashire I was called in to attend a young woman, who had been seized with low fever ten days previously. She was in a hopeless condition, and sank the next day. There were not, nor had there been, any other cases of fever in the village. On entering the room where she lay—a perfect den—I was struck with horror at the fœtor and the hideous picture which presented itself. This room (in a lodging-house) was about eleven feet square. It contained three beds; one contained my patient, and, up to the day previous to my visit, two other adult females; the second, two adult unmarried males; and the third was occupied by a man, wife, and child. The excretions of my patient had not been removed for twenty-four hours. There was no attempt at the preservation of decency. Another of the women fell ill of the fever; she was removed by her friends, and recovered.

*Cholera.* During the visitation of Asiatic cholera in 1849, I was resident for a considerable period of time in the district of Poplar, and was entrusted by Mr. Webb, the able and zealous union medical officer, with the chief charge of the poor in the Isle of Dogs. The western side of this delectable island, (or rather peninsula), called Millwall—by far the most populous portion—escaped the ravages of the epidemic tolerably well. Not more than seven fatal cases occurred; in fact, the town of Poplar, Blackwall, and contiguous district, suffered much more severely. The houses in this part of the island are decently built, drained, commodious, and by no means overcrowded with inmates. But on the eastern portion of the island (which lies over against Blackwall) and towards its lower part—not very far from the ferry to Greenwich—are, or were at the time of which I speak, several desolate-looking and miserable cottages; low-roofed, one-storied, having the aspect of pigsties rather than of human habitations. These wretched houses stood in a brickfield, which afforded employment to the persons living in them. They were crammed to excess with human beings. Four, five, and in some cases six adult men lived and slept in each room. These apartments were about ten feet square, by six feet in height. The walls were bare and damp; the floors mostly of mud. There was no thought of, or care for, ventilation. None of the casements would open. there was only one fireplace in each house. The pestilence soon made horrid havoc in these dreadful abodes. On my second visit, I saw in one house, three corpses; in a second two; in a third one; all victims of cholera since my first visit on the

previous day. There also lay ill of the pestilence at the same time in these three cottages five more persons, three of whom subsequently died. The fetid effluvium proceeding from some of the sleeping chambers in these houses was sickening, and strikingly characteristic of human emanations from overcrowding and absence of pure air. In one close (I may almost call it air-tight) room, six full-grown men slept nightly. Now, supposing the period of occupation to be only six hours, and the room to be filled with pure air at the commencement of the night, (both which positions certainly could not be asserted *as facts* in this case), there should have been a capacity for containing 2520 cubic feet of air: viz., 70 feet an hour for each person, which is somewhat, indeed, below the proper amount. I say, *there should have been* this capacity; for there was no chimney—the window was hermetically sealed—and the very close-fitting door was kept fast shut by some females who slept in the adjoining room. Now what was actually the case? The chamber was 13 by 10 feet, and 6 feet in height, containing, of course, but 780 solid feet of air. In a somewhat similar den in another of these cottages, in which slept a man, his wife, and child, and two other men—a tattered curtain being drawn across the room, separating the beds—I found, that instead of the due supply of pure air for the maintenance of healthy respiration, these unhappy persons (the child not even being taken into the account) were limited to about 25 feet of air an hour each.

The mind revolts at such horrible statements; yet such is common in the habitations of the poor in town and country. In consequence of the scantiness of house-accommodation and high rents, the labouring class are in too many places compelled to eke out their narrow means by underletting their wretched dwellings, or cramming them with as many lodgers as they can obtain.

*Scarlatina.* In the summer of 1846, this malady was epidemic in various metropolitan districts; but mild in type, and amenable to simple treatment. On a sudden, however, it broke out in a dismal court at the back of Covent Garden, (close to Hart Street, but I now forget the exact locality, which is unfortunately not stated in my notes), with fearful and uncontrollable malignity. I was requested to visit the scene, and take the medical charge of the sufferers. The state of things in the three houses to which the violence of the epidemic was chiefly confined in this court, was appalling. The description of one horrible room in the central house must suffice, as presenting an average picture of the whole. This apartment (on

the third floor) was about 12 feet square, filthy in the extreme. In one corner lay a woman, who had been confined about a fortnight, on a wretched pallet with her luckless infant. In another corner lay two girls, of eight and ten years of age, huddled together on a kind of rug. They were the daughters of the lying-in woman, and were evidently near death. At the other end of the room were four more children, varying in age from two to nine years, in different stages of the disease. *Their* mother was absent at the time of my visit. They were all cases of genuine *scarlatina maligna*—intense throat affection and prostration at the very onset of the malady. The two girls first mentioned died the next day, and two of the other children three days afterwards. There were altogether nineteen cases in the three houses, whereof ten terminated fatally. Now I can *confidently* attribute this fearful mortality to the overcrowding; as, although the disease prevailed extensively in the neighbouring streets, it did not assume the same malignancy of type, and yielded to remedial measures. The overcrowding and dirt of this court had long been notorious. I may add, that both myself and a friend who accompanied me on my visits, and shared the professional duties with me, contracted the disease, and narrowly escaped with our lives.

### II. DEFECTIVE HOUSE DRAINAGE AND VENTILATION.

It is unnecessary to dilate on the fact, now generally admitted, of the immediate connection of disease of various kinds with neglected drainage. Yet the bulk of the community are inclined to the very erroneous supposition, that this evil is confined almost entirely to large towns and squalid districts. But such an impression is far from the truth. Side by side with our wealth of power and enterprise we find, in this respect, elements of fatal weakness—of perdition—which can scarcely perhaps be paralleled among savage nations. Tall rows of handsome houses, in flourishing cities, too often conceal deformities worse than hideous—a repulsive background of ghastly squalor to the brilliant picture. Here, within a stone's throw of the dwellings of rank and fashion, are the harvest-fields of death. Stately dwellings, in country towns, are too frequently ill-drained, and worse ventilated. Whenever these evils exist, there also will appear, from time to time, their deplorable and certain consequences. The docks at Liverpool, filled with stagnant water, and receiving the refuse of hundreds of ships, proved to the adjacent neighbourhood during the epidemic of 1849, as fatal a neighbour as the tanks of filthy water under the wretched huts of Mevagissey.

The non-medical reader may not perhaps be aware, that the deleterious emanation from cesspools and ill-drained privies, consists chiefly of sulphuretted hydrogen. This gas is of so deadly a nature, that an atmosphere containing only 1-800th part will speedily destroy a sparrow. I found in the course of my experiment on this body, that a mouse was soon poisoned when confined in a large vessel of air impregnated with 1-600th of its volume. Professor Wagner states, that he found 1-400th ultimately fatal to a horse. And yet I have been in human habitations wherein the lead of the window-sashes, and all the exposed painted portions, were black from the action of this gas, which was constantly being given off in large quantities from a cesspool close by. Fever had been a frequent visitor in these houses.

The town of Birmingham has hitherto enjoyed very great immunity from *cholera*. Scarcely a case occurred within its precincts in the first visitation of 1832 ; and but very few in 1849 and 1853. This cannot be attributed to anything artificial in the condition of the inhabitants ; to their superior sobriety, cleanliness, or physical power of resisting disease. What then is most probably the cause ? I conclude that we may fairly consider it to be due to the favourable circumstances of the town as regards natural drainage. It stands on a light and porous sand-stone, and also abounds in steep inclinations. The perambulator on foot finds plenty of "up and down work" within its compass. As respects other sanitary matters, the town was then on a par with other large places, which suffered severely from the ravages of the epidemic.

The town of Hindley, in Lancashire, suffered fearfully from the visitation of the cholera in 1849. Out of a population of about 4000, it swept off, I was informed, 180 in the course of a fortnight or three weeks. No medical man, however, who visits this filthy town, will wonder at this, nor at the fact that almost *every epidemic* therein very often assumes a malignant type. I shall have to refer to this further on. A large portion of the houses are situate around cotton-mills, wherein the occupiers labour. More than fifty of these houses have literally *no drainage*, and *no water-supply*. There are no necessaries attached to them. The men use the public privies provided by the mills ; the women and children extemporise, *lieux d'aisance*, in chamber-utensils, which are being emptied, at all times and seasons, into a polluted stream, which flows sluggishly in front of the foremost row of houses. It is sad to conceive the depravity of sentiment which gradually grows up to tolerate the presence—the constant sight of the contact—

of human *egestæ*. In fact, there is no effort made, in some instances, to avoid or remove the most loathsome of excrementitious matters. Apart from the horrible *physical* contamination—a hot-bed for disease—the *moral* contamination is conspicuous. Let any one who doubts this, visit either the place I have named, (which is unhappily the type of a large number of small towns in the north), or the back streets of Glasgow, Liverpool, or London. Where such a dreadful state of things exists, the physical evil never stands alone. With it, we are sure to find associated every kind and degree of improvidence and licentiousness. There is no idea among such people of the laws of health; hence consumption of unwholesome food, and indulgence in intoxicating liquors, prevail. Cleanliness of person and habitation is altogether disregarded. In proportion to the degradation, so, alas! is the tendency to adhere to it; to sink deeper and deeper into the mire of pollution; to aggregate and multiply in numerical strength, and in the materials for mischief and disorder, the seeds of disease and crime. The public necessaries above alluded to have seldom any connection with drain or sewer. They simply consist of a pit or cesspool, which, when overflowing, and not before, is partially emptied. There is always an offensive stench in the vicinity of these abominations, and *fever is scarcely ever absent from it.* Partly owing to the natural influence of the daily association with places so filthy, and partly to the entire absence of anything like supervision, these public privies become the medium of the most disgusting profligacy.

*Deficient Ventilation* generally accompanies the evils, and aggravates the consequences, resulting from neglect of drainage. But it often exists *per se*, among classes generally supposed to enjoy exemption from such ills, and to an extent that could not be known save by actual experience. Atmospheric impurity is not confined to the abodes of the wretched. In the drawing-rooms of the great; in temples of pleasure or worship, proper ventilation is not the rule, but the exception. I have entered dissenting chapels in the midst of the service, both in town and country, and been immediately sickened and assailed with the sense of foul impurity from the concentrated reek of organic effete vapours. In tailors' and milliners' workrooms this evil is of a deplorable magnitude. I once visited a room (underground) in a house in London, wherein thirty-four young women worked for twelve, sometimes fifteen hours a day. It was about sixteen feet square; it had no fireplace, or artificial means of ventilation. The door and windows were kept fast shut. The sense of foul air was so offensive, that I

would rather have dined and slept in a good dissecting-room. Most of the poor young girls were pallid, anæmic, and scrofulous. One, I was informed, was then at home lying ill of fever. The greatest ignorance prevails on this matter, even among the educated classes. I lately attended a lady who suffered from severe headache and dulness of the mental faculties. I prescribed for some time in vain, until, at last, I discovered the cause of her malady. She slept in a very small chamber, as close as a box, and blocked up with furniture. The chimney had been carefully stuffed up with straw to keep out the cold! I cleared this out, and my patient had no more headaches. The affection had always come on during the night, and wore off gradually in the day-time.

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## THE INFLUENCE OF SEWER EMANATIONS.

By T. HERBERT BARKER, M.D., F.R.C.S.

I HAVE lately been making some inquiries as to the influence on the health of animals, of exposure for a long time to air rendered impure by the diffusion through it of emanations from sewers. The full details of these experiments are recorded elsewhere*; but, as the subject has important sanitary bearings, I send to the SANITARY REVIEW an outline of my researches, that what has been done, small as it is, may become the common property of the profession and the public.

The gaseous emanations from sewers have been subjected, to a certain extent, to chemical analysis. There have been thus detected in them sulphuretted hydrogen gas, sulphide of ammonium, carbonic acid, nitrogen, sometimes phosphuretted hydrogen, and various organic living products. Dr. Odling has recently pointed out the diffusion of an alkaline gas through sewer air. The subject demands much more attentive inquiry than has yet been bestowed on it. Such observations as I have made add but little to what has been previously told by the chemists. A physiological rather than a chemical history is before me.

For the purpose of experiment, I selected a large cesspool, which received, together with the animal excreta, the liquid refuse of an inhabited house. The cesspool was full, and had

* In a MS. essay "On Malaria", written for the Fothergillian Prize of the Medical Society of London for 1858.

at all times so bad a smell, that during hot weather the vicinity was scarcely tolerable. The inhabitants of the house, however, had not for many years suffered from any epidemic; nor did the near presence of the sewer seem to affect their general health. This fact it is but fair to state in connection with what has to follow.

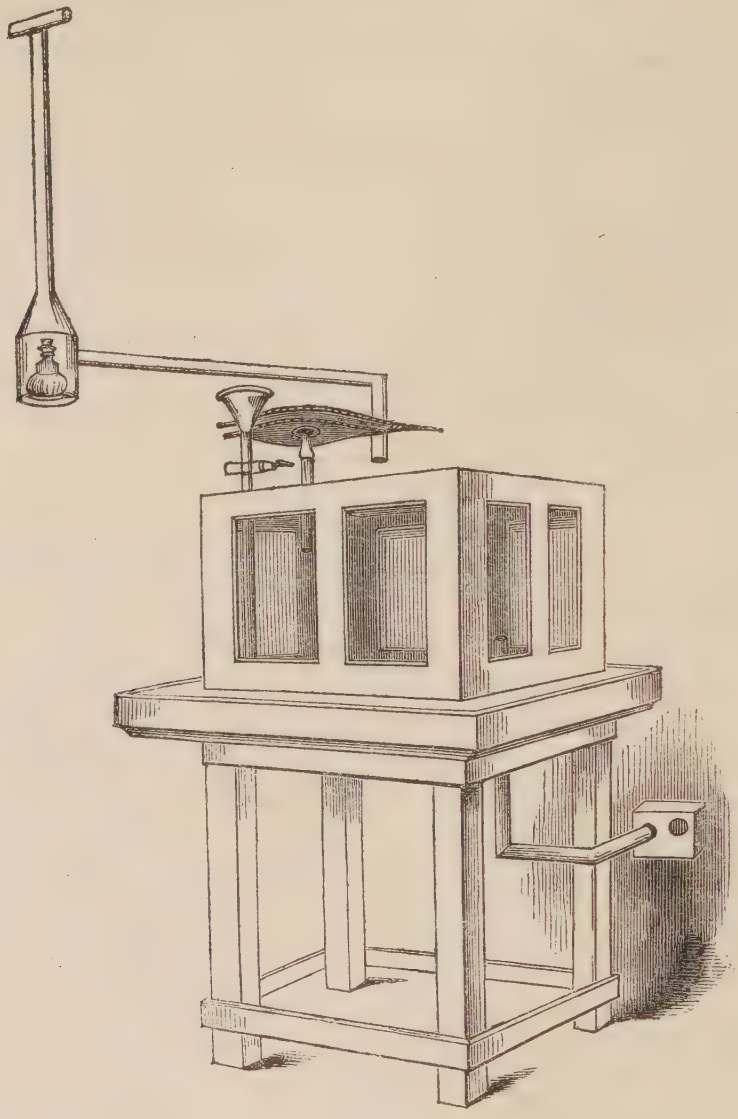
The well from which the house was supplied with water had at one time been contaminated in wet weather with the drainage from an adjoining heap of stable-manure. The defect was remedied by roofing over the manure heap, and protecting it by a well constructed side wall.

To enable me to carry out my inquiries, I had built, close by and nearly over this sewer, a small room. Two gutta percha tubes, one inch in diameter, were carried down into the cesspool through its upper wall, and terminated in two large inverted funnels a few inches above the surface of the sewage matter. The other ends of the gutta percha tubes were in the small room, and were so constructed that they could be opened or closed at pleasure.

By a bellows attached to the free end of one or other of the tubes, I was enabled at any time to draw off the sewer air and subject it to examination. I did this on numerous occasions—at times when the weather was very hot and the neighbourhood of the sewer most offensive—at times when the temperature was very low and the place inodorous. As a general rule, the sewer gas yielded neither acid nor alkaline reaction, but sometimes the reaction was alkaline. At all times, mixed with the common air, carbonic acid gas, sulphuretted hydrogen, or sulphide of ammonium, were detectable. When the reaction was alkaline, ammonia was evidenced. I could detect no other foreign products in the sewer air; these are possibly common to all sewers. I tested for evidence of cyanogen compounds, without any affirmative indication.

When this inquiry had progressed for several weeks, I set to work to try what the influence of sewer air was on animals exposed to it for a long time. For this purpose, I had made a chamber as represented in the drawing. The chamber is an imitation of one constructed, and for many years used in his inquiries, by Dr. Richardson. The chamber which is shown in the drawing subjoined, was made of wood and glass. It had within a cubic measurement of 5,832 cubic inches. In order to keep up a current of sewer air through the chamber, I introduced one of the gutta percha tubes into it at the lower part; from the upper part I carried a tube in the form of a small chimney, as represented in the drawing. At the point where

the long tube piping from the chamber makes a right angle upwards, it expanded into a conical box, in which a lamp was



placed, so as to create when alight a constant upward draught. The whole played well. When the chamber was closed and the lamp arranged, a current of the sewer air was kept steadily passing through it.

I also attached a pair of bellows to the chamber, in such a way that I could, whenever I was disposed, remove the air by working them, and subject it to investigation, without interfering either with the experiment which might be progressing. In the experiments to be related, the animals operated on were placed in the chamber, were fed by the funnel depicted in the drawing whenever necessary, and were subjected to the sewer gases as is now to be described.

On placing a young dog in the box at twelve o'clock noon,

I kept a current of the cesspool air passing constantly through the chamber by means of the chimney draught. I obtained decided symptoms. Half an hour after the exposure, he became very uneasy and restless; he vomited, and had a distinct rigor. In the course of the day he suffered from diarrhœa and tenesmus. After twelve hours exposure, he was allowed fresh air; but on the next day, when he was removed altogether, he was exhausted. The diarrhœa and vomiting had ceased, but he refused food for some hours. However, he soon recovered.

The air breathed in the chamber by this animal yielded evidence of sulphuretted hydrogen.

On placing another dog in the box connected with the cesspool, and subjecting him to a free current of the foul air, similar results occurred. In ten minutes the creature became very uneasy, and soon afterwards suffered from vomiting and diarrhœa. After these effects, however, he suffered but very little, although kept in the chamber for five hours. After removal, he quickly recovered.

A mouse placed in a cage was let down into the cesspool, to within three inches of the surface of the contained soil. The cesspool was freely open above, so that there was no exclusion of air. The animal was also well plied with food. After this exposure for four days, the animal seemed lively and well, and took his food heartily. On the next day he was found dead.

Another dog was subjected to the cesspool air during a period of twelve days, with such brief intermissions only as sufficed for rapid cleansing of the box. Throughout the time, food was liberally supplied him. The results were as follow :—

During the first day the animal was restless and uneasy, and refused food. On the second day vomiting came on, and was repeated frequently during the day. In the afternoon there was diarrhœa, accompanied by thirst and restlessness. On the third day, in the morning, he had marked shiverings, and refused all food. The feet were somewhat swollen. Towards evening he slept, but had a peculiar kind of tremor with each inspiration. On the fourth day he took food, and drank some milk. He slept during the forenoon, but was restless towards evening. On the fifth and sixth days he was much the same. On the seventh day he was restless and relaxed, and ate no food. On the eighth day he ate but little food, and was restless; he was by this time thinner and feeble. On the ninth day, he had eaten no food for two days, and seemed very ill and miserable. He was therefore taken from the box while it was cleansed, and offered food, which he ate voraciously and to repletion. When removed from the box his skin was preter-

naturally hot and dry ; he was very weak, and his gait feeble. On the tenth day his appetite was better, but he vomited and had diarrhœa in the evening. On the eleventh day he was very restless, and had but little appetite ; and on the twelfth, the symptoms being much the same, he was removed to his kennel. He walked feebly ; but soon after his liberation ate heartily of food. He continued very thin and weak for six weeks after his removal from the cesspool air.

Having thus ascertained in some measure what was the effect of long exposure to the vitiated air of the cesspool, I instituted another series of experiments. In lieu of exposing animals to this vitiated air, I subjected them, in the same chamber, to certain percentages of such of the individual gases as I had found at various times emanating from the cesspool. By comparing any results that might thus be obtained, with those which had already been obtained, I hoped to obtain a clue to the agent which, in the compound cesspool air, gave rise to the symptoms described.

*Sulphuretted Hydrogen.* I placed a puppy in the box as before, and introduced 100 cubic inches of sulphuretted hydrogen, or 1·714 per cent. The breathing became instantly laboured. In two minutes the animal fell insensible on his side, and in another half minute he was dead without a struggle.

An hour after death, the right side of the heart was found filled with fluid blood to distension. In the left side the blood was partly coagulated. The fluid blood coagulated quickly when received into a glass. The corpuscles of the blood were natural. The lungs were congested in the lower lobes and posteriorly. Above, they were pale and free from congestion. The stomach and abdominal viscera were healthy. The vessels on the surface of the brain were slightly congested.

I placed a puppy in the box as before, and drove in twenty-five cubic inches of sulphuretted hydrogen, or 0·428 per cent. In three minutes the animal fell on his side insensible. In this condition he lay for an hour, without any indication of pain, but with catching respiration. At the end of an hour he ceased to breathe.

Directly after death, the lungs were found generally pale, and were free from congestion. The right side of the heart was filled to distension with blood. The left side contained fluid blood. Blood coagulated in eight minutes after being removed from the body. It was dark in both cavities, and the corpuscles were irregular. They floated about freely between the slips, but not one was natural. Some were crenated at the

edges, and thus shrunken and broken up. The stomach presented nothing unnatural. The vessels of the brain were congested.

At thirty-seven minutes past four P.M. a dog was placed in the box, and twelve cubic inches of sulphuretted hydrogen gas, or 0·205 per cent., were slowly introduced. Within a minute, he fell on his side and was seized with tremors. The action of the heart became irregular, and within four minutes the respiration had apparently ceased. This cessation of respiration continued for about two minutes, when he began to breathe heavily. The respiration next became very quick and catching. Afterwards the quick respiration came on in paroxysms, with an occasional long-drawn inspiration. In three quarters of an hour from the commencement, the respirations were 112 per minute, rising sometimes to 120 ; they then became deeply stertorous, as in apoplexy. I removed this dog from the box at fifteen minutes past six, having exposed him to the gas one hour and thirty-eight minutes. The respirations were at this time stertorous, the limbs were rigid, and the head was drawn backwards. The respiration became gradually more feeble and catching, as if solely diaphragmatic, with a kind of hiccup. The body was universally cold. The respiration then became very peculiar, consisting of two short inspirations to one expiration ; and at fifteen minutes past two A.M. the dog died, nine hours and thirty-eight minutes after the commencement of the experiment.

On examination twenty hours after death, there was moderate cadaveric rigidity. The brain was found slightly congested externally, but presented no bloody points. The lungs were collapsed, dark in patches, and congested. The heart was enormously distended, and was remarkable for being excessively loaded with separations of fibrine. The right auricle, pulmonary artery, and the left auricle were literally distended with fibrinous concretions, to the almost entire exclusion of red blood. The right and left ventricles contained a large quantity of dark clotted blood, but there were some separations of fibrine in these cavities also. The fibrinous concretions in the right auricle and pulmonary artery were of pure whiteness. Those on the left side were red and striated, very closely resembling muscular fibre. The liver and spleen were congested. The kidneys were normal. The stomach, viewed externally, had a vascular appearance, but internally, the mucous surface was natural. There was no serous effusion into the abdominal cavity, nor any particular inflation of the alimentary canal with gaseous matters.

Another dog was put into the box, into which there were

introduced twelve cubic inches of sulphuretted hydrogen, or 0·205 per cent. He suffered from violent tremors and shortness of breathing. When nearly an hour had elapsed, he appeared better, and was removed at the end of five hours, not labouring under any morbid symptom.

A jackdaw was placed in the chamber, now altogether disconnected from the cesspool. Through the air of the box were diffused nine cubic inches of sulphuretted hydrogen, or 0·154 per cent. Within two minutes the bird essayed to vomit, and almost instantly afterwards was purged. He was incessantly restless, and the breathing was remarkably hurried and catching. After inhaling the gas for ten minutes, his movements became so feeble that it was with difficulty he stood. The pupils, at first contracted, soon became widely dilated. The beak was set widely open; and the tongue, dry and dark at the top, was protruded at each inspiration. After remaining in this condition for an hour and a half, he was removed from the box, and soon recovered.

A dog was placed in the box at eight a.m., and nine cubic inches of sulphuretted hydrogen, or 0·154 per cent., were introduced. Within two minutes the respiration became quickened, with reeling. For a quarter of an hour he was restless, and walked with difficulty. His movements were more like those resulting from intoxication than I had ever seen in a lower animal. This effect gradually subsided; and I took him out of the chamber in three hours, merely enfeebled.

Another dog was placed in the chamber. When he was composed to his new situation, six cubic inches of sulphuretted hydrogen, or 0·102 per cent., were introduced. At first there was watering of the eyes, followed by signs of thirst, muscular debility, and slight drowsiness. In half an hour the breathing had become hurried, and an hour later he suffered from violent diarrhœa; the breathing became more rapid, and the tremors more intense. Three hours after his first introduction the respiration was still hurried, and the heart beat so rapidly that it could not be counted with precision. I calculated, after several attempts to reckon the beats, that there were at least 240 in the minute. He was now again purged. Removed from the chamber, he soon recovered in the pure air.

Another jackdaw was put into the box as before, with six cubic inches of sulphuretted hydrogen, or 0·102 per cent. Within two minutes the bird commenced to vomit, (a curious symptom to observe in birds), and he was also freely purged. These symptoms continued for twenty minutes; afterwards the respiration was very hurried. After keeping him in the box for two hours

without much further modification of symptoms, he was removed, and soon recovered.

I put a common hedge-sparrow into the box, as before, with six cubic inches of sulphuretted hydrogen, or 0·102 per cent. Within two minutes he fell down insensible, and continued in this condition for the space of a minute. Respiration next became very hurried and gasping. He rose, but staggered a good deal and fell again on his back. Six minutes after the commencement of the experiment, he vomited, became convulsed, and died in fifteen minutes.

A linnet was placed in the same box as used in the preceding experiment, and without any further introduction of gas. It was put in within ten minutes after the commencement of the preceding experiment. The respiration became hurried at first, but this passed off in the course of half an hour. At noon, *i. e.*, one hour and seven minutes after introduction into the box, I removed it, apparently well, but it died in the evening.

A dog was introduced into the box as before, and three cubic inches of sulphuretted hydrogen, or 0·056 per cent., were driven in. He suffered almost at once from tremors of the muscles. The respiration was also quickened, and the heart-beat was extraordinarily rapid. At the same time he seemed sufficiently lively. After keeping him in the box for two hours, he was let out. The pulsations of the heart could be heard at a short distance from his body, the action was so intense. After removal, he was freely purged for a few hours, but eventually got quite well.

*Sulphide of Ammonium.* From sulphuretted hydrogen I next turned to sulphide of ammonium. This was diffused in vapour from its solution into the chamber in each experiment.

A large dog was placed in the box as before, and six drachms of sulphide of ammonium were introduced. He soon suffered from lacrymation, restlessness and vomiting. The vomited matters gave off copious white fumes. There was a peculiar harsh noise during expiration. In five hours he had recovered, and was then removed.

A dog was placed in the box with half an ounce of sulphide of ammonium. For ten minutes he laboured under excitement with lacrymation. He also had some tremor and tenesmus. The symptoms subsided, and he was removed from the box in five hours.

A jackdaw was placed in the box, and half an ounce of sulphide of ammonium was introduced. The bird vomited, and the vomited matters were of a yellow colour ; the beak was separated ; the tongue was dry and dark-coloured at the top. He

was much purged, and the ejected matters were liquid. He expanded both his wings to support his body. The respiration became quicker, and he died in two hours.

After death the blood remained fluid; the lungs were congested; the brain was congested. The other viscera were healthy.

I placed a dog in the box with one ounce of sulphide of ammonium. He soon laboured under profuse lacrymation and salivation, and became very restless. Within five minutes tenesmus showed itself. The respiration became hurried and difficult. He died within ten minutes.

Twenty-four hours after death, the right auricle and ventricle were found filled with quite liquid blood. The left cavities contained a small quantity of fluid blood. The venæ cavæ were distended with fluid blood. Both lungs were deeply congested, and of a dark colour. The vessels of the brain were congested. The stomach was distended with food and an offensive gas. It presented a reddened appearance of the mucous surfaces. The other viscera were of healthy appearance.*

*Carbonic Acid.* A hedgehog was placed in the box, and 88 cubic inches (1½ per cent.) of carbonic acid were introduced. For a quarter of an hour he remained curled up; he then breathed more quickly—sometimes irregularly, and occasionally drew a long inspiration. Soon afterwards he was very restless—running about and trying to escape. He was also freely purged. He became quieter afterwards, and was removed in four hours and a half, upon which he recovered.

I made afterwards several experiments with carbonic acid gas, exposing the animals subjected to experiment to 5, 2½ and 1½ per cent. of that gas. The effects were mainly referrible to impeded respiration, but in one instance diarrhœa was the result.

From the history of these experiments, few as they are, much useful information is attainable. They have brought before us the effects of the compound impure cesspool atmosphere: and they have shown the specific influence of certain particular gaseous poisons, which alone, or in company, emanate from the cesspool, and the decomposing vegetable heap, to pollute filthy localities.

In the first place, it cannot be doubted that cesspool emanations are, when steadily inhaled, poisonous. The dogs subjected to the cesspool air were all affected more or less. The symptoms were those of intestinal derangement followed by

* I have made six other experiments with sulphide of ammonium, but the results are so similar that it would be repetition to record them.

prostration, heat of the surface of the body, distaste for food, and those general signs which mark the milder forms of continued fever common to the dirty and ill-ventilated homes of the lower classes of men.

The peculiar poisonous action of sulphuretted hydrogen is well illustrated in these experiments. It will be observed that the symptoms produced even by the same dose differed in degree in different animals of the same class, the one animal dying from the effects of a dose which was insufficient to do more in the other than produce dangerous symptoms.

The symptoms arising from sulphuretted hydrogen are well marked, and may be considered specific. Vomiting and diarrhœa are the first and most prominent symptoms. The latter is painful; the vomiting is difficult and exhausting, and eventually there is insensibility and entire prostration. When the dose of the poison is at first very large, the prostration and the insensibility are immediate.

The pathology following such poisoning is definite. If the death take place quickly, the pathological evidence is the evidence of asphyxia; if the poison is long breathed in diluted dose, the pathology is modified, the fibrine of the blood is separated, and the heart is slowly clogged up with fibrinous depositions.

The dose of sulphuretted hydrogen required for the production of the specific symptoms is tolerably well shown. It is clear that so little as 0·428 per cent. is a dose absolutely and rapidly poisonous; that so little as 0·205 per cent. may be fatal; and lastly, that so minute a dose as 0·056 per cent. is sufficient to produce serious symptoms, eructations, tremors, rapid and irregular respiration, extraordinary rapidity of the pulse, and diarrhœa.

The effects of sulphide of ammonium, while they differ from those produced by sulphuretted hydrogen, are in themselves sufficiently distinct. Vomiting is a symptom of this poison, without purging, but occasionally with tenesmus. When the dose is very large, death occurs speedily, with quickened and laboured respiration. When the administration is kept up in small doses for many hours, the symptoms are those of excited circulation and thirst, followed by rapid sinking. The surface of the body, from being unusually hot becomes unusually cold. The tongue is protruded, dry, dark, and cold. There is constant jactitation of the limbs, subsultus tendinum, feeble, quick pulse, and ultimately death, which may occur even some hours after the animal has been removed from the poison and placed in the open air.

The pathology after death from sulphide of ammonium differs from that which follows the administration of sulphuretted hydrogen. When the exhalation is prolonged, and the death is gradual, the alimentary mucous surface is changed. The mucous coat is injected and softened in patches. The blood shows no fibrinous separations, but is dark, and either feebly coagulated, or entirely fluid. The blood-corpuscles are also much dissolved and changed, and there is congestion of fluid blood in all the vascular organs.

The dose of sulphide of ammonium required for the production of serious symptoms is difficult to calculate, and this, from the fact, that when the vapour of sulphide is diffused through a confined space, in which an animal is breathing, there is quickly a deposit on the floor of the chamber of the white bicarbonate of ammonia. This deposition is so rapid, indeed, that the effect of the poison is very quickly lost, so that constant renewal is required, and the calculation of dose is necessarily rendered obscure, since the animal is not breathing the same dose for any two minutes together. Dr. Richardson, in his late valuable work on the blood, describes the symptoms resulting from the action of ammonia or its salts as essentially typhoid. My experiments entirely confirm his observations. He remarks as follows:

"We have seen by direct experiment what the effects of ammonia are when it is thrown into the body in large quantities. Thus introduced, it produces what may be unhesitatingly considered *typhoid* symptoms. The tongue becomes dry and dark; there is an involuntary action of the muscles, varying from subsultus to violent convulsions; there are insensibility, extreme sensitiveness to sound, obscurity of sight, and ultimately, if matters are pushed far enough, death by coma. The morbid anatomy is equally demonstrative. The blood is dark and fluid; the serous membranes show petechial spots; the tissues are softened; and, in an experiment which I have lately performed on a dog, sulphide of ammonium being inhaled, there were patches of ulceration extending along the alimentary tract."*

For some months past the medicinal treatment of my fever cases has almost been restricted to small doses of the diluted hydrochloric acid, and the results have been most satisfactory. I notice too, in the Clinical Reports in the *Lancet*, that Dr. Chambers has lately been pursuing a similar plan of treatment, with considerable success. Dr. Richardson's important physiological researches will afford a satisfactory solution.

* Essay on the Cause of the Coagulation of the Blood. By B. W. Richardson, M.D. p. 345.

The symptoms arising from carbonic acid gas have been described so often by various authors, that I need not dwell on them, nor have I pressed them far experimentally. The respiration suffers first from this poison; there is prostration; and if the inhalation is prolonged, diarrhœa. The effects vary with the dose: the instances I have given above are the effects of a small long-continued dose. In larger proportions, insensibility, coma, and asphyxia, are the results.

The pathology varies. While congestion of the lungs is commonly noted as the leading pathological sign, it is clear, from one of my experiments, that when the gas has been long inhaled in small quantities, this rule is not without its exception; for, in one of my cases, the lungs were found of bright vermilion colour, and free from congestion.

The effect of carbonic acid gas on the blood is definite; it does not produce the fibrine deposit like sulphuretted hydrogen, nor the complete fluidity of sulphide of ammonium. But there is feeble coagulation, and sometimes a dark colour even in the arterial blood. If this gas be breathed continuously for a long time in a very minute dose, the brain suffers from congestion of blood, and the mucous membrane of the stomach is injected and reddened.

When the gas has been breathed for a long time in small quantities, so as not to produce insensibility, the effect does not pass off so speedily on placing the animal in the open air as is generally believed. In one of my experiments with carbonic acid, the animal, after being exposed for two hours to an atmosphere in which he breathed from the first two per cent. of carbonic acid, was left (not apparently suffering much) with pure air entering freely into his chamber. Yet he died after all.

The smallest dose of carbonic acid required to produce dangerous symptoms, cannot be determined absolutely from the experiment of placing an animal in a closed chamber and introducing the gas, inasmuch as the gas is also streaming off from the animal itself. I think, however, that the inference is quite fair, that from one to two per cent. of this gas is sufficient, when long inhaled, to produce decided symptoms of imperfect oxidation of the blood, and all the after prostration incident to such interference with the primary act and principle of life.

The symptoms which have thus been noticed as resulting from the inhalation of sulphuretted hydrogen, sulphide of ammonium, and carbonic acid, are sufficient to account for the effects arising from cesspool effluvia, without seeking for any further product from such emanations. Comparing the experi-

ments with cesspool air with those in which separate gases were employed, the inference seems clear to my mind, that the symptoms arising from the inhalation of the cesspool atmosphere were due mainly to the presence of a small amount of sulphuretted hydrogen, which gas was always present. If the experiments with the cesspool air be placed side by side with those in which sulphuretted hydrogen, in the proportion of 0·056 per cent., was administered by inhalation, the analogy between the two sets of results will be sufficiently unmistakeable.

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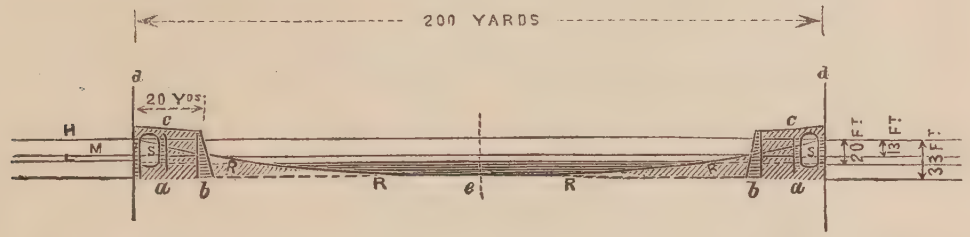
## A SCHEME FOR THE DRAINAGE OF LONDON.

By J. E. HUXLEY, M.D.

THE following scheme is intended to combine the embankment of the Thames, on both sides, throughout the Metropolis, with the formation of main sewer canals, the contents of which shall be subject to a tidal flushing towards the mouth of the river, twice daily, from flood tide to two-thirds ebb.

All along the Thames, from Chelsea and Battersea to London Bridge, on both sides, the sewer canals, contained in the embankments, should be formed. At the necessary distance from the high water shores, and between these and the water, the outer sewer walls should be sunk and built. The depth of the canals should be 3 feet below the lowest ebb of the stream; their height 4 feet below the soil and pavement of the embankments. Taking the rise of the Thames, at London Bridge, at 20 feet, the canals would thus be 25 feet in depth, and the top of the embankments 6 feet above high water. The breadth of the canals might be determined according to the area required,—say 20 feet, which would give a sectional area of 500 square feet. The height *only* of the canals might diminish somewhat from London Bridge upwards. The embankments should extend on each side along the river from Chelsea to London Bridge, or from such a point westward as shall fully include the western suburbs; a width of 20 yards on each side, measuring across the bed from the high-water shore, being taken for the embankments. (See diagram.) As the river is nowhere, between the points named, less than 200 yards in width, the loss to the river bed (if real loss at all) would not exceed one-fifth part at the most; and that fifth would be that part of the shore the least covered by water, and the least wholesome when exposed

to the sun and air. (The "mud-larks" would want compensation for the loss of vested interests?)




The canals should be continued, *as covered canals merely*, such a distance up the river as would be necessary to prevent tidal reflux of their contents, and consequent mixture with the stream. The canals, at both ends, should be open, in order, at the upper, to admit the waters of the river, which are to form the carrying and flushing power; and, at the lower end, for the gradual discharge of the contents into the estuary at Sea Reach with the ebb of the tides. The waters of the river would enter the upper mouths of the canals, whenever the level was more than 7 feet above low water. The admission of the rising tides by the lower mouths would be the means of dislodging, stirring up, and keeping solid contents from subsidence, and ready to descend with every turn of the tide. All London surface-water, as well as sewage, should be allowed to enter the canals, both as an assistance to the movement of their contents, and a means of frequently lessening the amount of the river water abstracted by the canals from the purposes of navigation.

The fall in these canals should be only that of the river itself.

*Course.* After arriving at, or near to London Bridge, the north canal should leave the river edge (the embankment to cease) and take a subterranean course direct for Blackwall, clear of the Isle of Dogs and West India Docks, by a tunnel of from three to four miles long; then it should take the river border again, and pursue it to Rainham Creek (about eight miles); thence by direct subterranean tunnel (through a point, two miles) to near Purfleet, when it would meet the river again, and follow it to near West Thurrock; thence it would tunnel again for two miles (through a point) regain the river, and follow it to Gray's Thurrock; thence it would tunnel again (east-north-east for about six miles) to its final termination at Sea Reach.

The last portion, between Gray's Thurrock and Sea Reach, as also the two miles at Rainham Creek, might, from the nature of the districts, be open canal.

The south canal should leave the river edge (and the embankment cease) at London Bridge, and take a subterranean course of about twelve miles, passing south of Greenwich,

Woolwich, and of Plumstead Marshes, and regaining the river just below Erith; continuing along the river to Greenhithe, there tunnelling through a point (two miles) to Northfleet; thence keeping the river border to Hope point, at the commencement of Sea Reach. A portion (about three miles) of the tunnel in Plumstead and Erith Marshes might, probably, be made open canal.

By means of the upper divergings from the river, the port of London would be left untouched, whilst the lower tunnels would obviate sharp bends in the river, which would offer obstacles if followed in the course of the canals. Occasional portions as open canal, where there was no sanitary objection, would be a safeguard to the works in case of extraordinary tides and floods. Twice a day the contents of the canals would be ebbing with the tide towards the sea; and also flowing twice in the opposite direction, but each time, from the accumulation of back water, falling short of the last point of departure.

*River above Chelsea.* Chelsea and Battersea should be the highest points drained *directly* into the canals; above these, the canals should be continued as unbroken tubes up stream, far enough to prevent the tides from driving back the contents, until *sewage* issue from the open mouths. But places on the river, situated higher up, and now draining into the Thames, should discontinue that practice, and be allowed (compelled?) to carry an independent main sewer, on each side, to receive successively the sewage from places on its course, and convey it to Chelsea and Battersea, there to be discharged into the metropolitan canals by a junction on the land side therewith.

*Saving the Sewage.* The question of saving and utilising the valuable contents of the canals ought not, in the first place, to be allowed to complicate and retard a work of such vital importance as the drainage of London; because the art of dealing with refuse matters on a large scale is not yet sufficiently advanced. At those points on the canals where it is proposed to make them open to the air (Rainham Creek, Gray's Thurrock, Plumstead Marshes), the required accessibility would be provided to any future scheme proposing to intercept sewage matter, and manufacture from it manure for the land.

*General Considerations.* Either the Thames must be used as the carrying power to rid London of its enormous sewage, or it must not. To resign it seems impossible; and it is, as all rivers are, the natural line of drainage. It is therefore desirable to derive its good offices in such a way as to preserve the main stream unpolluted, on behalf of navigation and of health. A river having such very widely different offices to perform,

must be divided in order to keep the performances separate. The depth of the proposed canals is put at the difference between the lowest ebb and the highest flow, with so much added as may give security against damage from extraordinary tides, and from floods from the land. The loss in width of river at London would be more than compensated by the retentive form given by the artificial banks, by their greater regularity of figure, and their directness from point to point.

Engineering difficulties may be safely committed to the enterprising talent of the age. The tributaries Lea and Roding on the left bank, Ravensbourne and Darent on the right, may be some of such difficulties. But the authors of the *Report on Metropolitan Drainage*, with their proposed outfalls at Mucking and Higham Creek, must be already prepared to deal with these.

*Cost.* Greatness of cost is about the last consideration which ought to deter from any scheme embracing the power really to do the work. The money would be forthcoming, if, by Act of Parliament, a "Metropolitan Drainage Stock" could be created, paying a good rate of interest secured upon rates. Thus a new stock for permanent investment would be created, secured upon the existence of London; and, therefore, not less safe than the 3 per cents., but more profitable to holders. If five millions sterling were required and spent, 5 per cent. thereon would not exceed 2*s.* per head per annum on the population of London. The amount expended, so that it be well spent, is therefore of no consequence.

One advantage of this scheme, which will be generally appreciated, is the preservation of all existing minor systems of house and street drainage in their present natural course towards the Thames. Look at the annoyance to persons in altering these; whilst any scheme, not availing itself of the course of the river, must devote half its outlay to altering what now exists! Places below London, on the river, should be allowed to embank over, and drain into, the metropolitan canals.

# SANITARY AND SOCIAL SCIENCE.

## THE PUBLIC HEALTH IN 1857.*

110,697 deaths were registered in the last quarter of the year 1857. This number exceeds by 14,176 the deaths in the corresponding quarter of 1856 ; and by 11,646 the average of the ten previous corresponding quarters. The mortality in the quarter was at the rate of 2·265 per cent. per annum, the average of the season being 2·167. The increase was equivalent to *one* on every 22 deaths. The increase of the mortality was greatest in the town districts or sub-districts, where 60,186 persons died, that is 6923 above the average 53,263 ; while the deaths in the country districts amounted to 50,511 or 4724 above the average, 45,787. After correcting for increase of population, on the assumption that the population in town and country increased at the same rates as in the ten years 1841-51, the mortality in the towns appears to be at the rate of 2·704 per cent., in the country at the rate of 1·926 per cent. per annum. The excess over the average of the season was ·182 in the towns, ·050 in the country ; it was therefore more than three times as great in the towns as it was in the country districts.

The deaths in the year 1857 amounted to 420,019 ; and if the population of England and Wales is correctly estimated at 19,304,000 in the middle of that year, the rate of mortality was 2·176 per cent., or somewhat less than 22 to 1000 of the population. The average of the ten preceding years is 2·276 per cent. ; consequently the mortality on the year 1857 was below the average.

The proportion of the deaths in a given time to a given population is not an exact measure of its vitality ; the mortality being very different at different ages, and the proportional numbers of young and old being disturbed by excesses of births over deaths, and by emigration, the deaths in two equal populations may vary from differences in their composition as to age, without implying any real differences in the vitality. A disturbance may also be produced from disproportions in the sexes. Under ordinary circumstances the annual rate of mortality, however, at all ages, serves as a sufficiently accurate measure of the relative sanitary condition of the population ; and where this is insufficient, the mortality at quinquennial or decennial periods of life may be separately determined.

* From the Registrar-General's Quarterly Return.

The mortality of England and Wales in 1857, has been compared with the mortality of England and Wales in the ten previous years, and it may be compared with the mortality (22·36 per 1000) in the 19 years 1838-56. It is below that average. But is that average itself, it may be asked, the true standard? What is the natural rate of mortality among Englishmen, under favourable sanitary conditions? Under such conditions how long do they live? How many of them die annually? No direct answer can be given to these questions. No large body of Englishmen is breathing pure air, living on a perfectly sound diet, free from all defilement, and free from vice, exercising duly the mind and the body generation after generation. We can point to no model city—to no model caste; we can discover no model parish in the country. In the matter of health we are all very ignorant, or desperately negligent. What courses then remain open to the inquirer? One only. The mortality of the districts of England in which the sanitary conditions are the least unfavourable, can be employed as the standard measure until happier times supply the real standard of vitality. Sixty-four districts, in various parts of the country, are found, where the mortality of the people ranged, on an average extending over ten years, from *fifteen* to *seventeen* deaths in 1000 living. This is not an accidental event; the mortality only fluctuates in such places slightly from year to year, and the death rate under the same circumstances will not be exceeded. The people dwell in sixty-four districts, extending over 4,797,315 acres, and their number at the last census was 973,070. Undoubtedly the sanitary conditions in which they live, are in many respects favourable. They generally follow agricultural pursuits; and they are scattered thinly over an open country, often on high ground, so that the impurities which they produce are dispersed and diluted in the air and water. They do not breathe each other's exhalations in theatres and churches. They do not drink water sullied by impurities. They do not drink poison in gin palaces. Their minds are not overwrought by dissipation, passion, intellectual effort. But visit their dwellings, and amidst much that is most commendable you will discover many sources of insalubrity. The bedrooms are often small, close, crowded; personal cleanliness is not much studied; the dirty pig, and filth of various kinds, lie here in close proximity to the house; the land there is imperfectly drained; in the winter, clothing, fuel, and food, are scantily enjoyed in all large or improvident families; ignorance yields its baneful fruits; medical advice is ill supplied or unskilful. Yet the annual mortality per 1000 of this million, men, women, and children, year after year, does

not exceed 17. Is it not evident, that under more favourable auspices the death rate would be still lighter? Under such sanitary conditions as are known, and with all the mechanical appliances existing, can we not imagine a community living a healthier life than these isolated people?

Without affirming on physiological grounds that man was created to live a destined number of years, or to go through a series of changes, which are only completed in eighty, ninety, or a hundred years, experience furnishes us with a standard which can only be said to be too high. 17 in 1000 is supplied as a standard by experience. Here we stand upon the actual. Any deaths in a people exceeding 17 in 1000 annually are unnatural deaths. If the people were shot, drowned, burnt, poisoned by strychnine, their deaths would not be more unnatural than the deaths wrought clandestinely by disease in excess of the quota of natural death; that is, in excess of *seventeen* deaths in 1000 living.

But it may be said that this standard cannot fairly be applied to determine the excessive mortality of large towns, which can never become so healthy as the country. How healthy towns may become we do not know. It is only proved, that the population of parts of many towns experiences a mortality little above the natural standard; and that the prevalent diseases are referable to causes which, evidently from their nature, admit of removal. The question, however, is not, Does the excessive mortality admit of removal? but, does it exist?—and these two questions have no logical connection. The existence of the excess is established by comparing the actual mortality with the standard. Then the chief causes of the excessive mortality are now ascertained; and if the people have done all they can to remove them, the residual excess may be held to be inevitable. But what is inevitable at one time and in one place is not inevitable at other times and in other places. It is therefore of the utmost importance to keep steadily in view all the excessive mortality over and above that which is implied in the great decree: "It is appointed unto man once to die." In London, during the sixteenth century, the population lived about twenty years on an average, and 50 died out of 1000 living; consequently the excess over 17 was 33. That this excess was not inevitable is now demonstrated; for with a great increase in number, the population now lives about 37 years, and the mortality has fallen to 25 in 1000. Is the excess of 8 deaths a year among every 1000 living inevitable? This cannot be admitted for a moment, if we regard only the imperfect state of those sanitary arrangements which the public authorities of London have within their power. Nor can

it be admitted that the excess of 5 deaths—or 22 deaths instead of 17—a year in every 1000 living, is inevitable in England and Wales, with evidence before our eyes of the same violations of the laws of nature in every district.

Whether the causes admit or do not admit of removal, the fact, then, is incontestable, and must not be lost sight of, that the excess of deaths in England and Wales over those from causes which exist in sixty-four districts, was 91,856 in the year 1857 ; for 420,019 persons died in that year, and about 328,163 persons would have died had the mortality not exceeded the standard of 17 deaths in 1000 living. Of the unnatural deaths, 18,328 happened in the country, or in the village districts, and 73,528 in the town districts. The portion of the loss of life falling during ten years in each of the 628 districts of the kingdom, has been published in an Annual Report, and deserves to be carefully studied.*

England is a great country, and has done great deeds. It has encountered in succession, and at times in combination, all the great powers of Europe; has founded vast colonies in America; and has conquered an empire in Asia. Yet greater victories have to be achieved at home. Within the shores of these islands the twenty-eight millions of people dwell who have not only supplied her armies, and set her fleets in motion, but have manufactured innumerable products, and are employed in the investigation of scientific truths, and the creation of works of inestimable value to the human race. These people do not live out half their days ; *a hundred and forty thousand* of them die every year unnatural deaths ; *two hundred and eighty thousand* are constantly suffering from actual diseases which do not prevail in healthy places ; their strength is impaired in a thousand ways : their affections and intellects are disturbed, deranged, and diminished by the same agencies.† Who will deliver the nation from these terrible enemies ? Who will confer on the inhabitants of the United Kingdom the blessings of health and long life ? Who will give scope to the improvement of the English race, so that all its fine qualities may be developed to their full extent under favourable circumstances ? His conquests would be wrought neither by wrong nor human slaughter ; but by the application of the powers of nature to the improvement of mankind.

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* Registrar-General's Sixteenth Annual Report, pp. 142-153.

† The annual number of deaths in the United Kingdom is about 616,000; and the number constantly sick is about twice the number of the annual deaths, or 1,232,000. If the annual rate of mortality per 1000 were reduced from 22 to 17, the deaths would fall to 476,000; the constantly sick to 952,000.

## THE CLOTHING OF SOLDIERS.

In the *Journal de la Physiologie* for January 1858, there is an excellent paper by Dr. Coulier, Professor at the Imperial School of Military Medicine and Pharmacy, entitled "Experiments upon the Materials which are used for Military Garments." The materials experimented on were as follow:

A. Cotton for shirting, coming from the firm of Waddington. Price, 0 fr. 963 c. the *mètre*.

B. Cotton for lining tunics. Waddington. Price, 0 fr. 963 c.

C. Unbleached linen for lining vests and cloaks. Price 1 fr. 75 c.

D. Dark blue cloth for soldiers' tunics and vests, 19 ains. Moules & Co. Price, 8 fr. 95 c.

E. Madder cloth for soldiers, 19 ains. Cesar Vinas. Price 8 fr. 43 c.

F. Cloth for cloaks (bluish) iron grey, 19 ains. Marcel & Renault, of Louviers. Price, 7 fr. 75 c.

H. Madder cloth for non-commissioned officers, 23 ains. Lataille Duchan, of Chateauroux. Price, 10 fr. 86 c.

K. Dark blue cloth for non-commissioned officers, 23 ains. Lataille Duchan, of Chateauroux. Price 11 fr. 40 c.

The points specially discussed by Dr. Coulier are:—

1. Materials considered as protective agents against cold.
2. Materials considered in regard to their absorbent power.
3. Clothing considered as protective agents against heat.

Dr. Coulier draws the following conclusions:

I think I have drawn from my researches the following conclusions: 1st, the colour of the clothing is without a sensible influence upon the loss of heat; 2ndly, every fabric is susceptible of absorbing, in the latent state, a certain quantity of hygrometric water,—this quantity, very considerable in wool, is less in canvas, and especially in cotton; 3rdly, this absorption takes place without immediate loss of heat to the human body; 4thly, the colour of the fabrics has a great influence upon the absorption of the solar heat; and it is sufficient, whatever else may be the nature of the clothing, to suitably modify the exterior surface in order to obtain the benefits which white materials offer during exposure to the burning heat of the sun.

## LONDON COW-HOUSES.

A COMMITTEE appointed by the Metropolitan Association of Medical Officers of Health, to report on the London cow-houses, have produced a short but useful report, from which a few of the more interesting particulars may be copied with advantage.

The number of establishments comprised in the returns collected by the committee amounted to 846, and the number of cows to 11,818. The dimensions of the sheds for the cows varied. To obtain accuracy, the committee calculated the cubic space allowed to each cow. The space allotted to each animal increases gradually from 200 feet to between 300 and 400. The paving was good in 554 cases, indifferent in 133 cases, and bad in 199. The drainage was good in 503 cases, indifferent in 103, and bad in 156. The ventilation was good in 528 instances, indifferent in 152, and bad in 122. The houses were free from bad smell in 463 cases, indifferent in 137, and offensive in 108.

In 71 cases there were no yards, or other open spaces, connected with the establishment; in 390 the yards are said to have been in good condition; in 137 they are stated indifferent; and in 172 bad.

The health of the cows is reported to have been good in 637 cases, indifferent in 83, and bad in 7. It was good in 87 per cent. of the entire number of establishments reported on. It was good in 86 per cent. of those with from 1 to 5 cows each; in 89 per cent. of those with from 6 to 10; in 84 per cent. of those with from 11 to 20; and in 87 of those with from 21 upwards. In some of the cases in which the health is reported to have been indifferent, it is stated merely that the cows looked out of condition; and in several instances in which the health is reported to have been good, it is mentioned (occasionally with details) that the health had been bad or indifferent at some antecedent period, varying from a few weeks to a few years back.

Under the head of health of cows, the information received is not trustworthy; for the health would appear, from the return, to be exceedingly good, and to be equally favourable in establishments of all sizes; whereas there are strong grounds for believing the direct contrary to be the fact: and, indeed, in one particular, no doubt, the returns are unfair to the larger establishments; for when the health is stated, in the answers, to be bad or indifferent, this statement is generally founded on the fact of *present* illness or indisposition in one or more of the cows; and thus, on this account, establishments with many

cows necessarily incurred a greater risk than others of being reckoned unhealthy. The truth is, that cow-keepers generally have, for obvious reasons, been very reserved on this subject, though, in some few instances, admissions have been made which are somewhat remarkable. Thus, one proprietor with 7 cows allows that he has lost 10, within the last seven months, from lung disease; another, with 4 cows, admits that 10 have died of the same complaint within the last three months; and one with 8 states that he has lost the enormous number of 230 in the course of twelve years.

There are several other facts, however, with regard to the health of cows, which, though not appearing in any numerical strength from the returns, are known, from other sources of information, to be true, and are of considerable importance as confirming statements made in the preceding paragraph. In the first place, it is well known that when cows are attacked with any serious acute disease, it is more advantageous to their owners to dispose of them at once to the butchers, than to keep them through an unprofitable illness, with the risk of death at the end; and, moreover, that there are certain persons, whose business it is to visit cow-houses periodically and frequently for the purpose of buying such animals as are out of health. Secondly, it is a significant fact that the rate of insurance imposed on cows is $7\frac{1}{2}d.$ in the pound for those in the country, whilst it varies between $1s.$ $6d.$ and $2s.$ in the pound for those in London, a difference said to be "dependent on the mode of lodgment and general management."

The Committee, in conclusion, offer the following rules for the regulations for cow-houses.

1. Every cow-house shall be paved with flag-paving, or other non-absorbent material, set and bedded in cement, with a proper inclination to the foot of the stalls, so as to drain into a channel leading by a fall of not less than $1\frac{1}{2}$ inches in 10 feet to a trapped gulley.

2. Every cow-house shall be provided with a proper trapped drain, to convey fluid matter alone into the sewers.

3. Every cow-house shall be furnished with an adequate supply of water, and be washed thoroughly at least once a day.

4. All solid manure and refuse shall be carefully swept up twice a day, be kept under cover, and be carted away every morning by seven o'clock from Lady-day to Michaelmas, and by eight o'clock from Michaelmas to Lady-day.

5. Every cow-house shall be kept in proper condition, and the walls be limewashed at least four times a year, within fourteen days after the quarter.

6. Every cow-house shall have a space of at least 8 feet by 4 feet for each cow, (when the cows are kept in separate stalls), or of 8 feet by 7 feet for every two cows, (when the stalls are constructed to hold pairs), with a cubic capacity, in either case, of at least 1000 feet to each cow; shall be properly lighted and ventilated; and when the state of the neighbourhood requires it, shall be provided with tight roofs and ventilating shafts, so as to convey the noxious exhalations above the level of the adjacent houses.

7. Every yard, in which a cow-house is situated, shall be well paved with stone or other impervious material (the joints of the paving to be run with grout), with such a slope towards the channels and trapped gulley as to permit the rapid escape of all fluids into the sewer; and shall be washed at least once a day.

8. The grain bins and receptacles for wash shall be kept properly cleansed and under cover.

9. No underground cellar, and no part of a dwellinghouse, shall be used as cowsheds.

*Signed,* S. R. Bristowe, *Secretary.*
Edw. Ballard, *Chairman.*

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## HYGIENIC TREATMENT OF PULMONARY CONSUMPTION.

The January number of the *American Quarterly Journal,* contains a paper by Dr. Flint, of Buffalo, on the "Treatment of Pulmonary Consumption by Hygienic Measures." Dr. Flint narrates the particulars of twenty-four cases of consumption, in all of which the old antiphlogistic methods, bleeding, emetics, low diet, confinement indoors, and such like injurious ingeniousnesses, were entirely avoided; but in which the tendency of the disease to natural arrest was favoured with the most happy results, by out door rough exercise and nutritious diet. Dr. Flint gathers from his observations in the treatment of this disease, that the measures are hygienic rather than medicinal. "The hygienic measures which are most important, are laborious exercise in the open air, conjoined with agreeable mental occupation; and, as conducive thereto, frequent change of business; the selection of an eligible climate and travelling are desirable, if not necessary; generous diet; and in many, if not most instances, the free use of alcoholic stimulants. The medicinal remedies, in addition to those which are simply palliative, are chiefly those of the tonic class."

It is most gratifying to see that the views so often expressed in this country of late, are thus independently making their way on the other side the Atlantic.

# PROGRESS OF EPIDEMICS.

## LOCAL REPORTS OF EPIDEMIC AND ENDEMIC DISEASES

*During the Months of December, January, and February*, 1857-8.

| Place. | County. | Lat. | Long. | Observer. |
|---|---|---|---|---|
| St.Mary, Scilly | Cornwall - | 49.50 N. | 6.24 W. | J. G. Moyle, Esq. |
| Teignmouth - | Devonshire - | 50.32 N. | 3.29 W. | W. C. Lake, Esq. |
| Odiham - - | Hampshire - | 51. 8 N. | 1. 3 W. | J. McIntyre, M.D. |
| Canterbury - | Kent - - | 51.17 N. | 1. 4 E. | G. Rigden, Esq. |
| Chatham - | Kent - - | 51.21 N. | 0.14 E. | F. J. Brown, M.D. |
| Wandsworth - | Surrey - - | 51.28 N. | 0. 7 W. | G. E. Nicholas, Esq. |
| Putney - - | Surrey - - | 51.28 N. | 0. 8 W. | R. H. Whiteman, Esq. |
| Up. Holloway | Middlesex - | 51.32 N. | 0.03 E. | W. B. Kesteven, Esq. |
| Swansea - | Glamorgansh. | 51.38 N. | 3.50 W. | W. H. Michael, Esq. |
| Colchester - | Essex - - | 51.54 N. | 0.52 E. | Henry Laver, Esq. |
| Aspley Guise - | Bedfordshire - | 52. 1 N. | 0.37 W. | J. Williams, M.D. |
| Saffron Walden | Essex - - | 52. 3 N. | 0.12 E. | T. Spurgin, Esq.<br>H. Stear, Esq. |
| Bedford - - | Bedfordshire - | 52. 8 N. | 0.51 W. | T. H. Barker, M.D. |
| Newpt.Pagnell | Buckinghams. | 52.10 N. | 0.42 W. | G. O. Rogers, Esq. |
| Sharnbrook - | Bedfordshire - | 52.12 N. | 0.40 W. | R. S. Stedman, Esq. |
| Wellingbro' - | Northamptons. | 52.20 N. | 0.40 W. | B. Dulley, Esq. |
| Beccles - - | Suffolk - - | 52.25 N. | 1.48 E. | W. E. Crowfoot, Esq. |
| Thetford - | Norfolk - - | 52.26 N. | 0.45 E. | H. W. Bailey, Esq. |
| Stourbridge - | Worcestersh. - | 52.28 N. | 2.32 W. | A. Freer, Esq. |
| Dudley - - | Staffordshire - | 52.30 N. | 2.10 W. | J. H. Houghton, Esq. |
| Barrowden - | Rutland - | 52.34 N. | 0.38 W. | H. J. Swann, Esq. |
| Wisbeach - | Cambridgesh. | 52.39 N. | 0. 5 E. | W. H. Hole, Esq. |
| East Dereham | Norfolk - - | 52.40 N. | 0.57 E. | J. Vincent, M.D. |
| Pontesbury - | Shropshire - | 52.43 N. | 2.50 W. | Wm. Eddowes, Esq. |
| Nottingham - | Nottinghamsh. | 52.50 N. | 1.10 W. | T. Robertson, M.D. |
| Burton-on-Trt. | Staffordshire - | 52.53 N. | 1.53 W. | S. Thomson, M.D. |
| Oswestry - | Shropshire - | 52.53 N. | 2.59 W. | P. Cartwright, Esq. |
| Wrexham - | Denbighshire - | 53. 2 N. | 3. 1 W. | E. Williams, M.D. |
| Hawarden - | Flintshire - | 53.11 N. | 3. 2 W. | T. Moffat, M.D. |
| Lincoln - | Lincolnshire - | 53.12 N. | 0. 5 W. | S. Lowe, Esq. |
| Alford - - | Lincolnshire - | 53.15 N. | 0. 6 E. | R. U. West, M.D. |
| Gainsborough | Lincolnshire - | 53.23 N. | 0.47 W. | D. Mackinder, M.D. |
| Liverpool - | Lancashire - | 53.24 N. | 2.59 W. | Thos. Bickerton, Esq. |
| Warrington - | Lancashire - | 53.25 N. | 2.32 W. | C. N. Spinks, Esq. |
| Wigan - - | Lancashire - | 53.32 N. | 2.33 W. | Jephtha Hussey, Esq. |
| Bolton - - | Lancashire - | 53.35 N. | 2.19 W. | W. H. Pendlebury, Esq. |
| Bramley - | Yorkshire - | 53.49 N. | 1.38 W. | J. N. Radcliffe, Esq. |
| York - - | Yorkshire - | 53.58 N. | 1. 3 W. | W. Procter, Esq. |
| Wst. Auckland | Durham - | 54.45 N. | 1.40 W. | G. Todd, Esq. |
| Rothbury - | Northumberld. | 55.25 N. | 1.50 W. | E. C. Summers, Esq. |
| Lerwick - | Shetland Isles | 60. 9 N. | 1. 8 W. | G. W. Spence, M.D. |

## QUARTERLY STATEMENT—No. XIII.

[*The dates denote that the disease appeared in the weeks then ending.*]

SCARLET FEVER.

Canterbury—January 15-29, Feb. 5
Wandsworth—Jan. 15, Feb. 5-12, 26
Putney—Every week
Upper Holloway—Jan. 15, Feb. 5
Colchester—February 12-19
Beccles—Every week
Thetford—December 4
Stourbridge—January 1, 22-29
Dudley—January 15-29
Wisbeach—December 4, 11
Nottingham—All Dec., Jan. 8

Oswestry—February 5-19
Wrexham—December 4-18
Hawarden—January 22, February 26
Lincoln—Dec. 18-25, Jan. 8-29, Feb.
Gainsborough—Every week [5-12
Liverpool—Every week
Warrington—December 18
Hindley, Wigan—January 8, 22
Bolton-le-Moors—Dec. 4-18, Jan. 8-29,
Bramley—Dec. 11, Jan. 22-29 [all Feb.
York—Dec. 4-18, Jan. 1-8, 22-29
West Auckland—February 12-26

MEASLES.

Odiham—February 26
Canterbury—Jan. 22-29, all Feb.
Chatham—Dec. 11, Jan. 8, all Feb.
Saffron Walden—February 26
Beccles—Every week
Stourbridge—February 12-19
Dudley—February 12-19
Barrowden—January 8-15
Wisbeach—February 5-12
Nottingham—Dec. 18, Jan. 29
Oswestry—December 25, January 1
Wrexham—February 26
Hawarden—December 18, January 1
Liverpool—Every week
Bolton-le-Moors—Dec. 11-25, Jan. 15-22, all February

SMALL-POX.

Odiham—February 26
Bedford—Dec. 25, all Jan. and Feb.
Wellingborough—December 4-18
Stourbridge—January 1
Wisbeach—Every week
Pontesbury—Every week
Burton-on-Trent—February 26
Oswestry—February 26
Wrexham—All December, Jan. 1-22
Gainsborough—All Jan., Feb. 5-19
Liverpool—Every week
Warrington—Dec. 18, Jan. 8, 29, Feb. 5
Hindley, Wigan—Dec. 11, 25, Jan. 8, 22, Feb. 5-12, 26 [22-29
Bolton-le Moors—Dec. 18-25, Jan. 1,
York—All Dec. and Jan., Feb. 12

HOOPING COUGH.

Canterbury—Every week
Chatham—Dec. 4-11, Jan. 22, Feb. 19
Upper Holloway—Dec. 18-25, Jan. 22-
Colchester—Dec. 4-11 [29, all Feb.
Saffron Walden—Every week
Newport Pagnell—Jan. 15-29, all Feb.
Sharnbrook—Dec. 11-25, Jan. 1-15
Wellingborough—December 11-25
Stourbridge—February 5
Dudley—January 29, February 19
Wisbeach—Every week
Nottingham—February 5
Oswestry—Every week
Alford—January 1, February 12-26
Gainsborough—All Jan. and Feb.
Liverpool—Every week
Warrington—January 15
Hindley, Wigan—Dec. 11, 25, Jan. 15, Feb. 5 [Feb. 5, 19-26
Bolton-le-Moors—Dec. 4-18, Jan. 8-22,

CROUP.

Teignmouth—December 18
Odiham—All February
Canterbury—December 25, Jan. 29
Chatham—February 5, 26
Upper Holloway—Dec. 11, Jan. 22
Aspley Guise—December 4-11
Saffron Walden—December 4-11
Newport Pagnell—Dec. 4, Jan. 29
Sharnbrook—February 12
Beccles—February 19-26
Thetford—December 11
Stourbridge—December 4, Jan. 15
Barrowden—February 5
Pontesbury—February 19
Burton-on-Trent—Jan. 15, Feb. 12
Nottingham—January 8
Oswestry—January 1, February 12
Wrexham—January 29, February 5-19
Lincoln—Dec. 18-25, Jan. 1, 22-29,
Alford—February 12 [Feb. 5
Liverpool—Dec. 18-25, all Jan. & Feb.
Hindley, Wigan—February 5-19
Bolton le-Moors—Dec. 11, 25, Jan. 1, 29, February 5

CATARRH.

Teignmouth—Dec. 4, 18-25, all Jan. &
Odiham—Every week [Feb.
Chatham—Dec. 4-12, Jan. 1, 22-29, all
Wandsworth—Every week [Feb.
Putney—All December and January
Upper Holloway—Dec. 18-25, all Jan.,
Colchester—Every week [Feb. 5-19
Aspley Guise—January 15
Saffron Walden—Every week
Bedford—January 29, February 5-12
Newport Pagnell—December 4-11, all January and February
Sharnbrook—All Dec. & Jan., Feb. 5-19
Wellingborough—Every week
Beccles—Dec. 18-25, Jan. 1, Feb. 5-12
Thetford—Every week
Stourbridge—Every week
Dudley—December 18, January 8, 29
Wisbeach—Every week
Nottingham—Dec. 25, all January
Burton-on-Trent—Every week
Oswestry—Every week
Alford—February 5
Gainsborough—Every week [Feb. 5
Warrington—Dec. 4-11, 25, Jan. 8, 22,
Bolton-le-Moors—Dec. 11-25, Jan. 1, 22-29, February 5-12

Bramley—January 29, February 5-12
York—Dec. 11-18, Jan. 1-15, 29, Feb.
Lerwick—Dec. 4-18, all Jan. [5-19

INFLUENZA.

Teignmouth—Dec. 4-18, Jan. 8, Feb. 5
Odiham—December 4-11 [Feb.
Chatham—Dec. 11-25, Jan. 1, 22 29, all
Wandsworth—Dec. 4-18, Jan. 8-22
Putney—All Dec., Jan. 1, 22-29
Upper Holloway—January 8
Wanstead—All Dec. & Jan., Feb. 5-12
Colchester—Every week
Aspley Guise—Dec. 11-25, Jan. 8
Saffron Walden—Every week
Bedford—Dec. 25, Jan. 8-15, 29
Newport Pagnell—Every week
Sharnbrook—All Dec. & Jan., Feb. 12-
Wellingborough—Every week [19
Beccles—January 8-22
Thetford—Every week
Stourbridge—All Dec. and Jan.
Dudley—December 11
Barrowden—All January and Feb.
Pontesbury—Dec. 25, Jan. 1, all Feb.
Nottingham—Jan. 8 29, Feb. 5-12
Wrexham—Jan. 1-22
Lincoln—Dec. 11-25, Jan. 1, 15-29, Feb.
Liverpool—Every week [5-19
Warrington—Dec. 4, 18, Jan. 29, Feb. 26
Hindley, Wigan—Jan. 15-22
Bolton-le-Moors—All Dec., Jan. 1-22,
Bramley—Jan. 15-22 [Feb. 5-12
York—All Dec., Jan. 1-8, 22-29, Feb. 5
Lerwick—Dec. 11-25, all Jan., Feb. 5, 19

ERYSIPELAS.

Teignmouth—Dec. 25, Jan. 15, Feb. 12
Canterbury—Dec. 25, Jan. 8, 29
Chatham—Dec. 4, 18-25, Jan. 1, 29, February 5, 19
Wandsworth—Jan. 1, 15, Feb. 12, 26
Putney—February 5
Upper Holloway—February 5 [12-19
Colchester—Dec. 18-25, Jan. 15, Feb.
Saffron Walden—Jan. 22, Feb. 19
Bedford—February 26
Newport Pagnell—December 11-18
Sharnbrook—Jan. 29, Feb. 5, 19
Wellingborough—January 15-29
Beccles—December 11
Thetford—December 4, 25, Feb. 12
Stourbridge—Dec. 25, Jan. 15, Feb. 5
Dudley—January 15
Barrowden—February 12
Wisbeach—December 4-18
Pontesbury—February 19-26 [5-19
Nottingham—Dec. 18, Jan. 22-29, Feb.
Oswestry—February 19-26
Alford—December 4, 18, January 22
Gainsborough—February 26
Liverpool—Every week
Hindley, Wigan—January 15-22
Bolton-le-Moors—Dec. 4-18, Jan. 15-
Bramley—Feb. 19 [29, Feb. 5-12
York—February 12
Lerwick—December 4, January 15, 29

AGUE.

Canterbury—Every week
Chatham—Dec. 6-18, all Jan., Feb. 12-
Colchester—Every week [26
Bedford—All February
Thetford—Dec. 18, Jan. 8, Feb. 12-26
Barrowden—February 12
Wisbeach—All January and February
Wrexham—Dec. 18-25, January 1

REMITTENT FEVER.

Teignmouth—December 18, Jan. 8
Odiham—February 19-26
Upper Holloway—January 8
Saffron Walden—All Dec., Jan. 1-22
Newport Pagnell—December 18
Thetford—Dec. 4-11, Jan. 1, 22, Feb. 19
Stourbridge—Jan. 15-29, Feb. 12, 26
Oswestry—Every week
Wrexham—January 15-29, February 5
Hawarden—January 22
Alford—Every week
Warrington—Dec. 4, 25, Jan. 22-29
Hindley, Wigan—Jan. 22, Feb. 5
Bolton-le-Moors—Dec. 18-25, Jan. 1-8, 29, all February

DIARRHŒA.

Teignmouth—Dec. 4, 18-25, Jan. 1-8, 22, February 12-26
Canterbury—Dec. 25, Jan. 8-29, all Feb.
Chatham—Dec. 4, 18-25, Jan. 1-8, 22-29, Feb. 5, 19-26 [all Feb.
Wandsworth—Dec. 4, 18-25, Jan. 1-22,
Putney—Dec. 18 25, Jan. 8-22, Feb. 12
Upper Holloway—Jan. 22-29, Feb. 5-12
Aspley Guise—Dec. 4-11, 25, Jan. 15-22,
Saffron Walden—All Dec. [Feb. 12-19
Bedford—All February
Newport Pagnell—Jan. 8-29, Feb. 5
Sharnbrook—All Dec., Jan. 29, Feb. 12
Beccles—January 8-22
Thetford—Dec. 4-11, 25, Jan. 1-8, 29, all
Stourbridge—Dec. 25, Jan. 1 [Feb.
Dudley—All Dec. and Jan., Feb. 12-19
Barrowden—Dec. 18-25, Jan. 1-8, 22, February 5-19
Wisbeach—All January and February
Nottingham—Dec. 4-18, Feb. 19
Burton-on-Trent—Dec. 11, Jan. 1, 15
Oswestry—All January and February
Hawarden—Dec. 11-18, Jan. 8-29, Feb.
Alford—January 1, all Feb. [5-10
Gainsborough—Dec. 18-25, all Jan. &
Liverpool—Every week [Feb.
Bolton-le-Moors—Dec. 4-18
York—Dec. 11, 25, Jan. 15-22, Feb. 12

Oswestry—January 1
Wrexham—February 19-26
Lincoln—January 29, February 5-12
Alford—December 25, February 12-26
Gainsborough—Dec. 18-25, all Jan. & [Feb.
Liverpool—Every week
Warrington—February 5
Hindley, Wigan—Jan. 8-22
Bolton-le-Moors—Dec. 18-25, Jan. 1, 22-29
Bramley—Dec. 25, Jan. 1, 15-22
York—December 4, 25, January 1
Lerwick—Dec. 11, Jan. 15-22, Feb. 5, 19

TYPHUS.

Teignmouth—Dec. 25, Jan. 22, Feb. 12
Odiham—February 12
Canterbury—Every week
Chatham—Dec. 4-18, Jan. 8-15, 29, February 12
Wandsworth—Dec. 11, Feb. 5, 19-26
Putney—January 15-22
Saffron Walden—All December
Bedford—Dec. 11-18, Jan. 1, 15 29, Feb. [5
Newport Pagnell—Every week
Wellingborough—All Dec. and Jan.
Beccles—Dec. 4-18, Jan. 29, Feb. 5-12
Thetford—All December, January 8
Stourbridge—January 1
Dudley—Every week
Wisbeach—January 8-29, February 5
Pontesbury—Every week
Lerwick—Dec. 11-18, Jan. 1, 22-29, February 12

DYSENTERY.

Odiham—February 19-26
Chatham—Dec. 4-11, all Jan. Feb. 12-19
Wandsworth—Jan. 1, 29, Feb. 19-26
Newport Pagnell—All February
Stourbridge—December 11-18
Nottingham—Dec. 4, 18-26, Jan. 1-22, [Feb. 5
Oswestry—February 5-12
Alford—All December and January
Gainsborough—All Jan. and Feb.
Bolton-le-Moors—All Dec., Jan. 1-15, 29, February 5, 19-26
West Auckland—All December

TYPHOID FEVER.

Colchester—Every week

PUERPERAL FEVER.

Chatham—January 15, February 5
Beccles—All February
Thetford—December 11

CARBUNCLE.

Teignmouth—Dec. 4, January 8
Chatham—January 22-29
Upper Holloway—February 26
Colchester—All February
Saffron Walden—Dec. 4, January 8
Bedford—December 18
Sharnbrook—Jan. 15, 29, Feb. 5-12
Wellingborough—Jan. 8-29, all Feb.
Beccles—January 8-22
Stourbridge—December 4
Nottingham—Dec. 25, Feb. 5.
Burton-on-Trent—December 11
Lincoln—February 12-26
Bolton le-Moors—Dec. 25, Jan. 1, Feb. [5-19
York—Dec. 18, Jan. 8, 22-29, Feb. 5

CHICKEN-POX.

Wandsworth—February 26

MUMPS.

Canterbury—February 19
Lerwick—Dec. 4, February 19-26

DIPHTHERITE.

Canterbury—All January and Feb.
Colchester—Jan. 22-29, Feb. 19-26

APHTHOUS ULCERATION OF MOUTH.

Lerwick—December 11, January 15

## ADDITIONAL OBSERVATIONS.

*St. Mary's, Scilly.*—Mr. Moyle returns a clean bill of health, with the following remarks:—

"The quarter has been very healthy. We have had no epidemics. The ozone average per week has been 3. The weather has been delightful; only one snow-storm for the winter."

*Teignmouth.*—Mr. Lake writes: "The high rate of temperature observed during the last two quarters continued through December, the temperature for this month being 48·8°. A sudden fall of temperature took place in the early part of January, the lowest minimum point for the quarter (23·8°) being registered on the 6th of this month. Through January and

February the temperature was somewhat variable, though, for the most part, mild; but between the mean temperature of December and that of January there was a difference of 6·8°; between that of January and of February, a difference of 1·8°. February closed with cold and bleak weather, and on the last two days of the month snow fell. The barometric pressure was persistently very high through December and January; the mean pressure for the former month being 30·264 ins.; for the latter, 30·286. Between December 5th and January 26th, the mercury on two days only fell between 30·000. The mean pressure for February was 29·877. The total rainfall for the three months of the quarter was respectively 0·768 ins., 0·493, 1·275; the mean ozone, 6·0, 4·9, 5·8. The prevailing winds, during December, were from south and south-west; during January, from north, south-west, and south; during February, from north, north-east, and east. I have nothing particular to report about the diseases of the quarter. I have not seen nor heard of the occurrence of any more cases of diphtherite; nor did many occur at first. The number of deaths registered in the town, from all diseases, was unusually high during December."

*Odiham.*—The case of measles was imported from Worthing; the case of small-pox was brought from Aldershott camp. Diphtherite has prevailed epidemically, of a low type, attacking adults as well as children. Nitrate of silver, locally applied, quinine, stimulants, and nourishment, constituted the treatment. Several deaths occurred. The cases of croup occurred during an intensely cold wind.

*Canterbury.*—Mr. Rigden says: "During the past three months the following deaths have been reported in this city:

| | *Dec.* | *Jan.* | *Feb.* | *Total.* |
|---|---|---|---|---|
| Fever | 7 | 3 | 6 | 16 |
| Hooping cough | 1 | 7 | 4 | 12 |
| Erysipelas | 0 | 1 | 0 | 1 |
| Measles | 0 | 0 | 1 | 1 |
| Diarrhœa and catarrh | 1 | 0 | 0 | 1 |
| Croup | 0 | 1 | 0 | 1 |
| Diphtheria | 1 | 3 | 2 | 6 |

"There is, unfortunately, almost always fever of a low type prevalent in this city; but it is mostly confined to the poorest, overcrowded, and badly drained districts. Diphtheria has been prevalent in this city since July last; but, in my experience, it has not assumed so malignant a character during the last three months as it did during the earlier period of its progress."

*Chatham.*—Dr. Brown writes: "Neuralgia and ague have continued prevalent; and dysentery (which is unusual in win-

ter) has affected a great many individuals, both young and middle aged. Metria occurred in two weeks, preceded by an unusual number of cases of abortion, some of which were attended by symptoms denoting a septic state of the system. I predicted the appearance of metria when I noticed these cases. The type of metria was paludal, with local congestion. Only a few cases occurred, and none proved fatal. There were also cases of phlegmasia dolens and inflammation of the breasts. In December a great number of children (many of them infants) suffered from inflammation of the kidneys, followed by anasarca, convulsions, and death. These cases were well marked; but renal disorder is common in infants, although not generally recognised. I have clearly ascertained that the urine is diminished in quantity, and sometimes suppressed for twenty-four to thirty-six hours before the occurrence of infantile convulsions. Probably uræmia is the invariable concomitant of convulsions. Nephritis in infants is detected by screaming just as if a pin had pricked the abdomen in its lateral aspect, accompanied by diminution of the renal secretion, and sometimes by vomiting."

*Wandsworth.*—Mr. Nicholas says: "The most prevalent and severe forms of disease during the past quarter were those of the respiratory organs, which, in three hundred and fifty-two pauper patients coming under my care, constituted upwards of one-third of the whole. With the exception of a few isolated cases of scarlatina of mild form, there has been an absence of the exanthemata; and no death has resulted from disease of the zymotic class during the period. The total mortality has been considerably below the average."

*Putney.*—Mr. Whiteman writes: "Scarlatina was frequent and severe throughout the entire quarter, but proved fatal in very few instances. Catarrh and influenza prevailed with considerable severity during December and January. Diarrhœa was of much more frequent occurrence during the latter part of December and the following month, than is generally observed at that season. The two cases of typhus that came under my notice were clearly traceable to bad ventilation and imperfect drainage. One case, when the removal of the patient was impracticable, proved very severe. The other was comparatively mild, the sufferer having been sent to the Fever Hospital early. A case of diphtherite came under treatment at the latter part of February, and proved fatal in five days from the first appearance of the disease."

*Colchester.*—During the last quarter, this district has suffered but little from disease. Typhoid fever cases are now rare.

Tonsillitis still continues prevalent; and there have been some few cases of diphtherite. Pleuropneumonia still prevails amongst cattle, but not to any great extent. The wind has been principally north-east and east; the weather dry.

*Saffron Walden.*—Mr. Spurgin writes: "Vegetation was unusually active till the commencement of January, when it received a check by slight frosts, the season being unusually dry. In February the weather became more severe, and continued so till the end; the prevalent winds being easterly and north-east, with very little snow, but much rain on the 4th. Small-pox has not been seen by me in this quarter."

Mr. Stear says that "the past quarter has been remarkably healthy in this neighbourhood, probably on account of the mildness and dryness of the winter."

*Bedford.*—Dr. Barker writes: "Small pox has prevailed during this quarter. The first case was clearly imported by a tramp. It has assumed a modified form generally, although severer, and even fatal cases, have occurred in a few instances. There are but few unvaccinated persons in this district. Fever of a typhoid character has prevailed; and a few cases of ague have occurred. Pleuropneumonia has occurred amongst cattle."

*Sharnbrook.*—Mr. Stedman writes: "Influenza has been the prevailing malady of the quarter. In many cases it has been complicated by bronchitis or pneumonia; but few fatal cases have occurred. The weather has been remarkably dry; and the barometer has stood at an unusual height all through the quarter."

*Beccles.*—Mr. Crowfoot states that measles and scarlet fever have been very prevalent during the last three months. The type of the latter disease has been very severe, several cases terminating fatally previously to the appearance of the eruption, and many being accompanied with severe diphtherite.

*Thetford.*—Mr. Bailey furnishes the following summary of the meteorology and diseases of the quarter:—

"December. The temperature of the month was very mild; and although the average difference between this and last December was only half a degree, yet, from the deficiency of wind, and the very little amount of rain, the weather was unusually fine. The range during the month was 33°. The barometrical diagram assumed that of a summer month, the deviation being but very little, and the prevalence of winds being from the south-west. Although the weather was so remarkably mild, yet the diseases of the month were numerous. Catarrh and influenza were most prevalent, scarcely a family

escaping them. With children, bronchitic affections and pleuritic diseases were fatal in four cases. I have seldom known the disease so general in this month for some years. One case of spasmodic croup came under treatment; during the paroxysm it caused the greatest alarm, but the patient recovered in a few days. Quinsy, and both chronic and acute rheumatism, were also very general, occurring, more particularly, in the working classes; as were also ague and remittent fever, four cases of the latter coming under treatment. Diarrhœa also prevailed throughout the month, attacking all grades, and leaving great prostration of strength. Typhus fever occurred in every week of this month, attacking the labourers, and running a long course. No immediate cause could be assigned, other than atmospheric influence. Special care was given to free ventilation, and the avoidance of nuisances in the locality. One case of puerperal fever took place, in a single woman, a few days after confinement; it quickly terminated fatally. The casual diseases of the month under observation, were convulsions, consumption, apoplexy, abscess, paralysis, hysteria, hæmoptysis, fistula, menorrhagia, abortion, psora, porrigo, eczema, and acne. Amongst cattle, the lung disease was, in this locality, very prevalent and fatal. Homœopathy is cried up much by farmers, who believe that a globule placed upon the tongue of a bullock will do wonders: but the deaths amongst cattle were numerous. Catarrhal affections and glanders were also prevalent; and two cases of inflammation of the bowels terminated fatally. From the mildness of the month it has been recorded, that currant-bushes budded almost into leaf, and also that raspberries were gathered. The wheat assumed a most luxuriant aspect. The quantity of rain during the year has only been fourteen inches, being less than the average by eight inches.

"January 1858. Since January 1855, I have not recorded so little fluctuation of the barometer as in this month, and probably to the same cause may be attributed the little wind and rain, the latter amounting to little more than a quarter of an inch, and only five days of wind. The glass ranged between 30· and 30·60. It was not so in the thermometical range, there being great changes of temperature during the day. Some nights were very severe. On the 6th the thermometer was as low as 18°, and the next day as high as 50°. These vicissitudes of temperature occasioned the prevalence of influenza, which was unusually epidemic, scarcely a family escaping its influence. It was fatal in one case, occurring in a feeble elderly person. With children it was frightfully

prevalent, and to the very young, or infants, it was fatal. Quinsy and common sore throats were also general; the former more particularly so than for many years. Only one case of ague, and one of remittent fever took place; and diarrhœa was less frequent than in December; and only one case of typhus occurred. The casual diseases of the month, and under medical notice, were syphilis, hæmorrhoids, dyspepsia, enlargement of the liver with dropsical effusion, nervous diseases, and some cutaneous complaints. The same diseases existed in cattle as in last month, now attacking cows during calving, and ending fatally. Among sheep, no diseases were recorded.

"February. Although in the former months of February we experienced some few days of low temperature and nights of severe frosts, yet, taking the average of the month, altogether it was colder. The highest temperature was 48°, the lowest 20°, and on the grass 18°. Thus the temperature assumed a more wintry range than usual. The barometical range was, throughout the month, less fluctuating. The prevailing diseases were catarrhal affections and influenza; diarrhœa, which was more general; sore throats; ague; and there was a case of remittent fever. Some cases occurred, in children, of bronchitis, from exposure to the easterly winds; and two cases of diphtherite, of a mild character, came under notice, but this disease has not assumed an epidemic nature. Several cases of consumption terminated this month; and also four cases of inflammation of the lungs. The casual diseases of the month were phlegmonous inflammation of the leg, gout, rheumatism, enlargement of the heart, chronic disease of the liver, epistaxis, hydrocele, atrophy, spinal disease, and convulsions. With cattle there seemed less disease, but it was of the same character as in last month. Cows in calving did badly, and several died. Sheep were healthy. Vegetation has fortunately been kept back by the frosts."

*Record of Deaths in Twenty-one Parishes* (*population* 9,574) *from the Registrar's Book.*

| *December* 1857. | | *January* 1858. | | *February.* | |
|---|---|---|---|---|---|
| Diarrhœa ..... | 1 | Influenza ..... | 1 | Consumption ..... | 7 |
| Puerperal fever .... | 1 | Consumption ..... | 1 | Inflamm. of lungs .. | 4 |
| Consumption ..... | 2 | Croup ..... | 1 | Congestion of lungs | 3 |
| Bronchitis ..... | 4 | Apoplexy..... | 1 | Croup ..... | 1 |
| Pleuritis ..... | 1 | Congestion of brain. | 1 | Jaundice ..... | 1 |
| Apoplexy..... | 1 | Atrophy ..... | 1 | Congestion of brain | 1 |
| Convulsions ..... | 1 | Debility ..... | 1 | Spinal disease..... | 1 |
| Paralysis..... | 1 | Decay of nature .... | 1 | Convulsions ..... | 2 |
| Abscess ..... | 1 | | | Dropsy..... | 1 |
| Debility ..... | 5 | | | Debility ..... | 3 |
| Decay of nature .... | 1 | | | Decay of nature .... | 5 |
| | 19 | | 8 | | 29 |

*Stourbridge.*—Bronchitis prevailed among children during the last fortnight of the quarter. In many houses three, or four, or five, were affected. It was very fatal in infants only a few weeks old, about the third, fourth, fifth, or sixth day of the illness. The winds were chiefly from the east.

*Dudley.*—Mr. Houghton says: "Though my report does not shew the existence of small pox in Dudley, the registration of seven deaths from that cause proves that it still exists, though only very slightly as compared with former reports. Deaths from scarlet fever, hooping cough, and croup, are on the increase. Were some of the cases reported as croup cases of diphtherite? I think this probable. Two deaths are registered from diphtherite; and one case (not fatal) of the disease has fallen under my care in the last quarter. It was attended with profound prostration, and yielded, as other cases had done, to nutrients and stimulants freely used, and tincture of sesquichloride of iron with hydrochloric acid. The deaths from diarrhœa and fever were few for Dudley; thirty-six deaths were caused by convulsions, or one in eleven of the whole deaths. The number of deaths registered were 397; the average of nine corresponding quarters is 302: the excess being 95.

"The drainage of the town will be commenced this spring, and it is hoped that the excessive mortality so long and notoriously existing, will be diminished.

"A grave typographical error occurred in my last report from Dudley (vol. iii, p. 408, l. 30). It is there made to appear, that my cases of diphtherite occurred under the 'best' sanitary conditions; whereas the very reverse was the fact. Two of the cases occurred in the immediate vicinity of slaughter-houses, where *pigs* also were kept; and in one of these two places complaint had been made of a foul sewer. Almost immediately after my patient recovered from the attack of diphtherite, and whilst she was yet in the country for change of air, her husband was seized with typhus of a bad character, from which he escaped with difficulty. The third case happened in a low part of the town, and was in close relation to some foul *privies and pigsties.* In a subsequent case, the disease was associated with an offensive open drain, running along the gable end of the house, and close to the sittingroom and bedroom which the patient occupied."

*Barrowden.*—Mr. Swann writes: "The weather up to February was unusually mild, dull, and dry. The wind was south-west the whole winter; in the beginning of February it veered round eastward, since which time we have had it cold, with some rain. Influenza has been unusually severe; it has not before been so prevalent in this neighbourhood for many years.

At Haringworth, measles have been very severe all the quarter; a few cases have proved fatal. Diarrhœa, too, has remained with us, but has not been so severe as in last quarter."

*Wisbeach.*—Mr. Hole says that "so long a drought, at this season of the year, has scarcely been known in the memory of the 'oldest inhabitant.' The drains and dikes have been nearly all empty. People are drinking water not fit for cattle; and much diarrhœa and sickness is the result."

*Pontesbury.*—Mr. Eddowes says: "Small-pox has continued here during the quarter; the cases have mostly been isolated. There were three cases only in one parish, containing a population of upwards of 900 inhabitants. Two of them had had small-pox previously; the third had been vaccinated about twenty years ago: he had the disease very mildly, only having about half a dozen pocks on his face. Of the two who had had small-pox previously, the one was twenty-one years of age; she had had small-pox when an infant a few weeks old: the other was a woman upwards of fifty years of age; she had been inoculated, and had the disease just before vaccination became general. The latter two had the disease very severely. The young woman, who was twenty-one years of age, got through with the greatest difficulty."

*Burton-on-Trent.*—The epidemic and endemic diseases of the last quarter have been little varied. Affections of the respiratory organs, and occasional diarrhœa, have been the most prevalent. In the town of Burton-on-Trent, small-pox has been very extensively diffused, and many deaths have occurred.

*Gainsborough.*—Dr. Mackinder writes: "Since my last report, this neighbourhood has been, and is still, suffering from epidemic throat affection in all its varieties, save that which has a fatal termination. Scores of cases have been under my own observation, and doubtless many have been attended by other practitioners, and all have required the tonic treatment. As previously described, in the majority of cases, the local manifestation of this general disease has been a congested rubeolated condition of the fauces, uvula, and palate, sometimes accompanied by inflammation of the tonsils and mouth, (simple and ulcerative), and of the tongue, while, far from unfrequent, are fully developed specimens of diphtheria, with bronchitis, gastro-enteritis, diarrhœa, dysentery, and fever. Pain is still the exception in these cases. Lassitude is much complained of; prostration is occasionally present. Sometimes there is a dry incessant cough, which, though occasionally relieved by the application of nitrate of silver, often sets all treatment at defi-

ance. The parotid glands are frequently involved ; and a rash, like that of scarlatina, is sometimes seen on the face and chest ; in one case I saw it on the hands, which were swollen. Another patient had a little eruption on the chest, which came out on three successive evenings. She was confined to her bed for a few days ; and after her recovery, her infant was seized with scarlatina, the rest of the family escaping. Surely diphtherite must be closely allied to, or identical with, scarlatina, the *materies morbi* being meted out in less effective doses? There is a disposition to recur, in some of the fully developed cases of diphtherite ; second and third crops of minute shot-like deposits of lymph having been observed. Many of the worst cases under my care have been the most amenable to treatment ; the milder ones assuming a chronic and persistent form, without much detriment to the general health. One of my cases, which appeared mild at first, ran into typhoid, in consequence of exposure to the effluvium of an untrapped sewer. Another had a severe attack of erysipelas of the face and head. In addition to the chlorate of potassa, I have given hydrochloric acid, with preparations of iron and quinine ; and, in some cases, continue to apply the solid nitrate of silver with advantage ; the diet being of the most liberal description. A woman under Mr. Sharp, at the dispensary, required a bottle of wine daily for some time : she recovered.

"We have had but a few cases of (fully developed) scarlatina ; all did well. Small-pox was introduced from Sheffield on the first of January—an enviable new year's gift ! The first case was a child one year old. The eruption appeared four days after its arrival here. While at Sheffield, it used to run into the house of a neighbour affected with small-pox. The next was an adult from the same town, and from him the third took it by the intercommunication of another party. One woman had the small-pox a few weeks before her accouchement, and the infant was born with a few pustules, which afterwards maturated. Altogether I have heard of nine cases, all of which I believe had been vaccinated ; and no fresh ones have been reported for several weeks.

"Erysipelas, rheumatism, gout, colic, and pneumonia, have occasionally occurred : diarrhœa, dysentery, bronchitis, and hooping cough, have made a longer stay among us ; while fever has been performing the part of the shy and diffident stranger. I have seen one case of sudden death from valvular disease of the heart ; one, in an infant, from smothering ; and one from the plugging up of a large artery. The subject of this sudden arrest of the circulation, was the wife of a respectable trades-

man; she had fifteen days previously given birth to her second child. The labour was natural, easy, and of short duration, and the only thing requiring attention afterwards was an excessive secretion of milk. On February 21st she sat up to her tea and supper, appearing well, and in good spirits, though she complained of being fatigued when she returned to bed. At four on the following morning she gave the child the breast, commenting playfully on the abundant supply of milk; and a few minutes before five she rose up convulsively, said she was choking, and breathed her last. In consequence of the suddenness of the death, the cause of which was suspected, I was allowed to make a *post mortem* examination, and found a large branching fibrinous plug completely stopping up the right pulmonary artery, and its immediate ramifications; while the entrance to the left pulmonary artery gave lodgment to a large and tolerably firm concretion. The heart was rather thin, and the lungs were slightly congested; but there was no further trace of disease about the body. One woman, in whom the operation of transfusion of blood had been previously performed, died from anasarca. At Morton, a village about a mile distant, a boy, aged twelve, had inflammation of the fauces, followed by bronchitis, hæmatemesis, exudation of blood from the fauces, vesicles of pemphigus on both knees, and typhoid with delirium. He recovered, after an abundant supply of wine, beef tea, quinine, and iron."

"Herewith I send a daily register of cases that have been under my care for the past three months. I have not given the number of patients, but merely the names of the diseases, as recorded in my books, when treatment commenced. My next will embrace the daily observations on meteorology, by Mr. Dyson, so arranged as to show the connexion between disease and the weather."

| | *Diseases of Private Patients.* | *Diseases of Pauper Patients.* |
|---|---|---|
| | 1857. DECEMBER. | |
| 1. | Faucitis,* catarrh, rheumatism, | Dysentery, tonsillitis. |
| 2. | Dysentery. [diarrhœa. | Catarrh, bronchitis. |
| 3. | Faucitis, scarlatina, diarrhœa. | Menorrhagia. |
| 4. | | Catarrh, diarrhœa, bronchitis. |
| 5. | Dysentery, bronchitis, faucitis. | Typhoid, bronchitis. |
| 6. | | Bronchitis. |
| 7. | | Dyspepsia, fever, diarrhœa. |
| 8. | Faucitis. | Bronchitis. |
| 9. | Bronchitis. | Hæmatemesis. |
| 10. | Bronchitis. | Faucitis. |

* I regard faucitis (inflammation of the fauces, or epidemic sore throat) and diphtherite as the same disease; but have confined the name diphtherite to the cases where a deposit of lymph took place.—D. M.

| | | |
|---|---|---|
| 11. | Diphtherite, bronchitis, faucitis, | Faucitis, uterine hæmorrhage. |
| 12. | [colic. | Faucitis, dyspepsia. |
| 14. | Colic, faucitis. | Faucitis, conjunctivitis, catarrh. |
| 15. | Faucitis, diarrhœa, bronchitis. | Faucitis, bronchitis. |
| 16. | Faucitis. | Faucitis, vertigo. |
| 17. | | Faucitis, hæmicrania. |
| 19. | Faucitis. | Frostbite, dysentery. |
| 20. | Faucitis, diarrhœa, dysentery. | Diarrhœa. |
| 21. | Diphtherite. | Faucitis. |
| 22. | Diphtherite, faucitis. | Dysentery. |
| 23. | Amenorrhœa- pleurodynia. | |
| 24. | Faucitis, diarrhœa, abortion. | Periostitis, diarrhœa, lumbago. |
| 25. | Diarrhœa,with cramps & vomiting. | Purulent ophthalmia. |
| 26. | Faucitis, diarrhœa, dysentery. | Diarrhœa, herpes, fever, conjunctivitis, |
| 27. | Catarrh, bronchitis. | Gravel. [epilepsy. |
| 28. | Faucitis, diarrhœa. | |
| 29. | | Faucitis, dysentery, menorrhagia. |
| 30. | Faucitis, choleraic diarrhœa. | |
| 31. | Faucitis, choleraic diarrhœa, | Hæmorrhoids. |

1858. JANUARY.

| | | |
|---|---|---|
| 1. | Bronchitis. | |
| 2. | Faucitis. | Bronchitis, diarrhœa. |
| 3. | Faucitis. | Bronchitis. |
| 4. | Faucitis, bronchitis, dysentery. | Bronchitis. |
| 5. | Faucitis, bronchitis. | |
| 6. | Phthisis, convulsions. | |
| 7. | Faucitis. | Bronchitis, colic. |
| 8. | Faucitis, bronchitis, dysuria, | Faucitis with diarr., dropsy, lumbago. |
| 9. | [thrush. | Porrigo scutulata, frostbite, herpes. |
| 10. | Typhoid, congestion of brain, bronchitis. | Synovitis. |
| 11. | Faucitis, hooping cough. | Bronchitis, congestion of brain, eczema |
| 12. | Faucitis, abortion, bronchitis, hooping cough, diarrhœa. | Vertigo, struma. |
| 13. | Rheumatism, bronchitis, gastro- | Catarrh, rheumatism, bronchitis. |
| 14. | Gastrodynia. [dynia, dysentery. | Catarrh, bronchitis. |
| 15. | Diphtherite, dysentery, pleuro- | |
| 16. | Scarlatina. [dynia. | |
| 17. | Faucitis, pleurodynia, diarrhœa, bronchitis. | Epilepsy. |
| 18. | Faucitis, with diar. & bronchitis. | Bronchitis, diarrhœa. |
| 19. | Faucitis, dysentery. | |
| 20. | | Bronchitis. |
| 21. | Faucitis. | Diarrhœa, catarrh, hooping cough. |
| 22. | Faucitis with mumps, abortion. | Prostatitis, dyspepsia. |
| 23. | Diarrhœa. | Bronchitis. |
| 24. | Diarrhœa, epilepsy. | Faucitis. |
| 25. | Bronchitis, hæmorrhage. | Prurigo. |
| 26. | Catarrh, hysterical epilepsy. | Dysentery, porrigo. |
| 27. | Bronchitis, diarrhœa, tonsillitis. | Bronchitis. |
| 28. | Diarrhœa. | Diarrhœa, catarrh. |
| 29. | Bronchitis. | Diarrhœa, bronchitis, catarrh, tænia. |
| 30. | Faucitis with dysentery, hooping cough, diarrhœa, incipient paralysis, emphysema. | Otorrhœa, faucitis, diarrhœa. |

FEBRUARY.

| | | |
|---|---|---|
| 1. | Hysteria, hooping cough. | Diarrhœa, catarrh, bronchitis, chil- |
| 2. | Faucitis, diarrhœa. | Catarrh. [blain, insanity. |
| 3. | Bronchitis, hooping cough. | Bronchitis. |
| 5. | Faucitis with dysentery, catarrh. | Diarrhœa. |

| | |
|---|---|
| 7. Faucitis with bronchitis, small-pox, bronchitis. | Colic. |
| 7. Diphtherite, scarlatina. | Frostbite. |
| 8. Faucitis, bronchitis, gout, dysentery, diarrhœa. | |
| 9. Scarlatina, menorrhagia. | Erythema, dyspepsia. |
| 10. Faucitis, bronchitis, stomatitis ulcerosa, pleurodynia. | Bronchitis. |
| 11. Faucitis with mumps. | Faucitis, adenitis. |
| 12. | Faucitis. |
| 13. Diphtherite, scarlatina. | Faucitis, catarrh, diarrhœa, scabies. |
| 14. Dysentery. | Faucitis, pleurodynia. |
| 15. Faucitis, bronchitis, catarrh, dysentery. | Pneumonia. |
| 16. Diarrhœa, catarrh. | |
| 17. Diphtherite, faucitis, hooping cough, bronchitis. | Dyspepsia. |
| 18. Bronchitis, hooping cough, congestion of brain. | Diarrhœa, bronchitis. |
| 19. Epistaxis, tetanus. | |
| 20. Epilepsy. | Colic, adenitis. |
| 21. Bronchitis, pleurisy, syncope. | |
| 22. Faucitis with eczema rubra, syncope. | Faucitis, bronchitis, phthisis, dyspepsia. |
| 23. Bronchitis, dysentery. | |
| 24. Faucitis, bronchitis, tonsillitis, fever, hooping cough. | Rheumatism. |
| 25. Epilepsy. | Bronchitis. |
| 26. Pleurodynia, stomatatis ulcerosa, | Anasarca. |
| 27. Faucitis, urticaria. | tonsillitis. Conjunctivitis. |
| 28. Faucitis, parotitis. | |

"The diarrhœa, dysenteria, and bronchitis, were chiefly among children. 67 paupers were attended, as fresh cases, in December; 64 in January: and 54 in February. Of these, 22 were between 60 and 70 years old; 19 between 70 and 80 years old; 12 between 80 and 90 years old; and one, who had been living in poverty and wretchedness for many years, died of bronchitis at the great age of 94.

The subjoined meteorological report is furnished by Mr. Dyson:—

"There has been very little variety in the weather to record during the quarter ending February 28th. The temperature was mild in the first two months and the greater part of the last; it reached 57° on the 22nd December; 56° on the 3rd January; and 51° on the 5th February; but fell, during the first night of the same month, to 19°, or 13° below the freezing point. The barometric pressure was generally uniform, and for the most part above 30 inches. The sky was usually clear, and the atmosphere seldom disturbed by any storm, till the first week in March. The wind blew chiefly from the south and south-west till February, and during that month cold north-easters prevailed. The amount of rain which fell in December was ·21 inches; in January ·44 inches; and in February ·42, making a total of very little more than one inch of rain in three months. Ozone was freely developed from

the 2nd to the 8th, and from the 16th to the 22nd of December; in January, from the 4th to the 10th, and from the 24th to the 31st. In February, from the 2nd to the 9th, and from the 17th to the end of the month. 'Everybody' has remarked 'what a mild winter we have had.'"

*Liverpool.*—"During the quarter (including 14 weeks) ending the 2nd January, 3849 deaths were registered in Liverpool, including 136 on which inquests had been held. The number is 230 more than the corrected average of the same period of former years. That this excess was chiefly owing to atmospheric causes, is shown by the fact, that 1258 deaths were caused by diseases of the lungs, while the corrected average is only 1028, the mortality from these diseases having been thus more than 22 per cent. above the average. Zymotic diseases caused 1125 deaths, about 9 per cent. more than the average. Of these, scarlatina was the most fatal, having caused 397 deaths. Typhus caused 175, being more than in any previous corresponding period since the Irish epidemic of 1847-48. Hooping cough caused 200 deaths, diarrhœa 136, small-pox 59, (more than in any quarter of the previous three years), croup 27, measles 23, syphilis 18."

For the deaths in each week and the meteorological returns, see the table on next page.

*Hindley, Wigan.*—Mr. Hussey writes: "There is nothing particular to record this quarter. The wind for the most part has been easterly. In my own district, I never saw less sickness."

*York.*—Mr. Procter says: "There has been a considerable amount of general indisposition during the quarter. Small pox has been very general, but on the decline in February. There has also been a considerable amount of scarlatina, but mild in its form, and not fatal in the majority of cases. Diphtherite has frequently shown itself, with gastric irritation; but I have neither met with, nor heard of, any cases of death from this cause."

*Lerwick.*—Dr. Spence writes: "December, January, and the first half of February, were extremely changeable, boisterous, wet, and stormy, there being few days on which rain did not fall, and few nights on which it did not blow a violent gale. The prevailing wind was south-west. There were two falls of snow, one in January, and the other in February, but it did not lie for more than twenty-four hours. The latter half of February was remarkably fine, and unusually dry; so much so, that there was some scarcity of water. The prevailing winds were easterly. Comparing this with the corre-

| Deaths. Week ending | December. 5th. | 12th. | 19th. | 26th. | January. 2nd. | 9th. | 16th. | 23rd. | 30th. | February. 6th. | 13th. | 20th. | 27th. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Scarlet fever* | 28 | 23 | 34 | 20 | 28 | 17 | 24 | 16 | 24 | 26 | 22 | 26 | 18 |
| Measles | 3 | 1 | 4 | 2 | 3 | 3 | 11 | 7 | 13 | 14 | 26 | 17 | 12 |
| Small-pox | 3 | 4 | 12 | 4 | 5 | 8 | 4 | 9 | 8 | 14 | 9 | 12 | 10 |
| Hooping cough | 16 | 8 | 12 | 15 | 9 | 11 | 10 | 9 | 15 | 11 | 9 | 8 | 11 |
| Croup | .. | .. | 3 | 2 | 2 | 2 | 1 | .. | 5 | 4 | 7 | 4 | .. |
| Chicken-pox | .. | 2 | .. | .. | .. | .. | 1 | .. | .. | .. | 1 | .. | .. |
| Cholera | .. | .. | .. | .. | .. | .. | 1 | .. | .. | .. | .. | .. | .. |
| Diarrhœa | 6 | 6 | .. | 11 | 3 | 3 | .. | 6 | 4 | 4 | 9 | 1 | 3 |
| Typhus | 11 | 8 | 16 | 12 | 2 | 15 | 11 | 14 | 6 | 12 | 11 | 10 | 8 |
| Diphtheria | .. | .. | .. | .. | .. | .. | .. | .. | .. | 2 | 1 | 3 | .. |
| Diseases of lungs | 127 | 114 | .. | 78 | 82 | 94 | 90 | 87 | 94 | .. | 93 | 18 | 87 |
| Scurvy+ | .. | .. | .. | 1 | .. | .. | .. | .. | .. | 1 | 1 | .. | .. |
| Intemperance | 1 | 1 | 2 | 2 | .. | .. | 1 | 1 | .. | 3 | .. | .. | .. |
| Syphilis | 2 | 1 | 1 | 3 | 1 | 2 | .. | .. | 3 | .. | .. | 2 | 1 |
| Total deaths during each week | 297 | 257 | 268 | 247 | 205 | 259 | 258 | 263 | 268 | 276 | 309 | 275 | 255 |
| **METEOROLOGICAL OBSERVATIONS.** | | | | | | | | | | | | | |
| Barometer: Mean | 29·95 | 30·41 | 30·10 | 30·13 | 30·47 | .. | 30·33 | 30·43 | 30·13 | 29·79 | 30·12 | 30·07 | 30·08 |
| Dew-point temperature | 42·8 | 43·8 | 42·3 | 43·7 | 39·9 | .. | 41·2 | 36·0 | 35·4 | 35·3 | 30·4 | 32·6 | 26·4 |
| Thermometer: Highest (mean) | 50·0 | 53·4 | 51·1 | 53·0 | 48·1 | .. | 49·8 | 45·8 | 45·5 | 46·4 | 42·0 | 42·5 | 44·3 |
| Lowest (mean) | 41·6 | 44·6 | 44·6 | 47·1 | 42·2 | .. | 42·4 | 39·7 | 38·0 | 37·1 | 33·6 | 33·2 | 32·4 |
| Mean | 45·3 | 49·0 | 47·9 | 50·1 | 45·2 | .. | 46·1 | 42·8 | 41·8 | 41·8 | 37·8 | 37·9 | 38·3 |
| Mean of 11 years | 41·3 | 43 5 | 43·3 | 40·5 | 40·6 | .. | 39·7 | 40·9 | 40·3 | 41·2 | 41·3 | 41·6 | 42·4 |
| Range | 8·4 | 8·9 | 6·5 | 5·7 | 5·9 | .. | 7.5 | 6·1 | 7·5 | 9·3 | 8·4 | 9·2 | 11·9 |
| Mean range, 11 years | 6·8 | 6·8 | 6·8 | 5·9 | 5·8 | .. | 5·8 | 6·0 | 6·4 | 6·6 | 6·7 | 7·3 | 7·4 |
| Rain fell on days | 2 | 2 | 3 | 3 | 2 | .. | 3 | 2 | 1 | 1 | 1 | 1 | 0 |
| Rain fell during hours | 5 | 1·7 | 12·5 | 8 | 1·2 | .. | 2·7 | 1·7 | 5·7 | 0·8 | 1·5 | 1·2 | 0 |
| Amount of rain in inches | 0·21 | 0·03 | 0·73 | 0·24 | 0·03 | .. | 0·14 | 0·11 | 0·16 | 0·05 | 0·05 | 0·03 | 0 |
| General direction of wind | SSE. | S. | S. W. | W. | SW. SSE | .. | W. | W. N. | SSE. | var. | SE. | E. | SE. |

* Zymotic diseases have lately been much more prevalent in Liverpool than for some months previously, and the mortality generally has been greater.

+ The cases of scurvy occurred in sailors, who came from ships as they arrived from distant voyages, and were entirely cases imported into Liverpool.

sponding quarter of last year, we find the difference to consist in the absence of small-pox and fever, and the prevalence of dysentery. Diarrhœa was more common, and erysipelas less so than last year, while the prevalence of catarrh and influenza was about the same in both years. I saw several cases of aphthous ulceration of the mouth; but though on the outlook for them, I met with no cases of diphtherite. A few mild cases of scarlet fever occurred in an adjoining parish; they could not be traced to any source. The total number of deaths during the quarter was 19: the average age was 37, there being five below 5, and eight above 70. The causes, in those cases in which medical certificates were furnished, were: bronchitis, 2; phthisis, 2; infantile remittent fever, 2; apoplexy, 2; epilepsy, 1; erysipelas, 1; chronic hepatitis, 1; and debility from old age, 3."

## SANITARY LEGISLATION.

THE dissolution of the late Government reduces to symbolical tinder a *Public Health* Bill prepared by Mr. Cowper. As many as seventy large pages are filled with the clauses of this public health proposition, the which, but for the mutability of governmental power, we should now have been discussing with all the weight of argument necessary for so ponderous a document. Suffice it to say over the grave of this unhappy production, that if its author could by his fiat say to the world of progress, "Stop dead short at this present, that my bill may have fair play," the bill, turned into act, might answer some partial purposes; but, as a bill projected at a time when the progress of science is so remarkably rapid, it is the most inconsistent state paper published in modern times. We dispute not that the bill is well intentioned, and drawn up with care; but assert simply, that in the face of the progress stream, it must even have been out of joint in one short year.

*A Letter from the Metropolitan Board of Works to Sir Benjamin Hall* contains a series of objections to the drainage plan proposed by Messrs. Dalton and Simpson, and adverted to in our last. The objections raised are, against open sewers with diminished outfalls delivering at low water; the large increase in the dimensions of sewers to provide for the increased area and rain fall; the enlargement of the area to be drained by gravitation; the use of syphons; and the conveyance of the western sewage to the Surrey side of the river. To this letter, Messrs. Dalton and Simpson have replied with considerable

force of argument; and if their plan, as a whole, were commendable, it would not fail from the objections of the Metropolitan Board of Works.

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## REPORTS AND RETURNS.

*A Report of Mr. Gurney to the first Commissioner of Works on the State of the River Thames* enters into a description of the various kinds of sewage, "the solid, the fluid, and the aeriform", and their distribution. The specific gravity of insoluble sewage being 1·325, it will sink at the rate of a foot per minute in still water, or in slow currents. In currents above 170 feet per minute, the sewage is always in a state of mechanical mixture. The pollution of the Thames is occasioned by precipitation and retention of sewage in the retrogrades and brattice cesspools in the river. To relieve the river of this, Mr. Gurney suggests—

That all the retrogrades and brattice cesspools be destroyed.

That all obstructions to a uniform flow of the river, at low water, be removed.

That the projections along the shore be rounded off, and the hollows filled up.

That the serrated edges of the river at low water be made plain, and continued along the whole line of low water mark.

That the width of the water may, when the tide is at the lowest ebb, be not more than 140 yards from side to side; so that the river may run not only in an uniform current, but at a rate of not less than 225 feet per minute.

The cost of these improvements would be, comparatively speaking, small, and their accomplishment as a temporary sanitary provision, of great public importance.

From a recent *Report on Convict Discipline in Western Australia*, we regret to learn that our friends, the "overfed convicts", are still suffering from the gluttony plague. Dr. Rennie is here again insisting on the reduction of the ration; and Dr. Galbraith, the superior in position, is still in opposition, and is supported in his views by the superintendent, who reports that the frequent change of dietary has caused much discontent among the prisoners, and has given rise to manifestations of feeling of a mutinous tendency.

*A Report on the Spread of Yellow Fever in Bermuda in* 1856 contains much interesting matter, on which we might enlarge freely. Suffice it that Dr. Rees, the Medical Inspector, opines, on sound data, that the disease originated spontaneously in the island.

THE

# SANITARY REVIEW.

JULY 1858.

## HOSPITAL HYGIENE.*

THERE are few subjects, in the domain of history, more curious or interesting than those which relate to the origin and progress of hospitals for the reception and treatment of the sick poor. This history involves many points relating to the modern hospital,—to its construction, its objects, and its management. We might grow very learned, or, at all events, very lengthy (and length sometimes passes for learning), on this topic; but we are content to take up Beckman, whom we consider to have pithed this matter of history most thoroughly, and following him mainly, to state so much as shall bear on the prominent fact to be insisted on in this short essay,—viz.: that the modern hospital partakes largely of the defects of the hospital of the past, and that such defects are often directly mental and even opposed to the objects of the sick hospital of the present day.

The buildings called hospitals seem first to have been intended for the reception and convenience not of the sick, but of the healthy, and for a religious rather than for a temporal purpose. In so far as the learned Beckman is to be trusted, the idea is sustainable, that the primitive hospitals were erected by the clergy at holy places, or at stations on the way to them; whither pilgrims, coming from afar, might find

* Additional Suggestions, with a view to the Improvement of Hospitals. By JOHN ROBERTON. Manchester: 1858.

Report of the Commissioners appointed to Inquire into the Regulations affecting the Sanitary Condition of the Army, and the Organisation of Military Hospitals. London: 1858.

Beckman's History of Inventions, Discoveries, and Origins. By JOHNSON. London: H. G. Bohn. 1846.

Netley Hospital: a Return to an Address of the House of Commons. 1857.

An Account of the Diseases most frequent in the British Military Hospitals in Germany, from January 1761 to March 1763. By DONALD MONRO, M.D. London: 1764.

The Census of Ireland for 1851: Report on the Status of Disease. 1854.

tenancy and comfort in their self-sacrificial journey. In this way Palestine became the site of the earlier of these institutions. The pilgrimage to this—the goal of the pilgrim's expectations, was one of physical danger. In its boundaries no friendly Christian village nor Christian inn greeted the wayfarer; who, too often, therefore, worn out with his self-imposed obligations sank by the way, a martyr to his cherished superstition. To prevent these evils, as we say, the hands of the clergy erected pilgrim hospitals, where the wearied recruited their strength, and the faithful their hope. Jerome, perchance, set one of the first examples, by building an hospital at Bethlehem; while Paula his friend, anxious to follow in the labour, besprinkled the paths to that famous village with similar resting-places for the "devout idlers" who turned Bethlehemward. The design thus established admitted of easy imitation and extension. The protection of the hospital ought, surely, not to be confined to the pilgrim; the mere traveller would find equal advantage in the provision. It proved so; long previous to the eleventh century, so far had this view been realized, that hospitals—superintended by special brotherhoods, and often very liberally endowed by the princely of the earth—became common over the whole of Europe; affording aid and shelter alike to the barefooted enthusiast yearning for the sight of the manger or the sepulchre, and to the well-clothed merchant hungry only for the dross of the silver and the gold.

The first *sick* hospitals were the offshoots of the hospitals of rest above described. They who, visiting the hospitals of rest, brought with them cutaneous maladies and pests, must needs be removed from the healthy and must have a dwelling for themselves—a pesthouse. The pesthouse, in its turn, admitted of imitation and extension. If a pesthouse were a convenience to a hospital or temporary home for pilgrims or travellers, how much more a convenience should it be to a town or a city! The idea took root, grew, and flourished; and the hospital for the sick became the fact of time.

One of the first sick hospitals, perhaps *the* first, was of English production. In 1070, Lanfranc, archbishop of Canterbury, built a hospital for the special purpose of receiving the sick, and so arranged it that one half of the institution was applied to the reception of men, the other of women. The example again became general, and sick hospitals began to appear wherever the monastery or cathedral marked the pretensions of the all powerful church. The sick hospitals were first placed under the management of the bishops, who

ultimately gave them in charge to their deacons. Afterwards, when the hospitals of the Church were imitated by the lay populations, the bishops, by virtue of their office, claimed the right to thrust the episcopal nose into the layman's brick and mortar. As the power of the bishop waned, the nose was pulled forcibly back, and the admission claimed as a right became possible only by courtesy.

Thus far we have followed simply the history of Beckman, but it is clear that the learned historian was not conversant with Hibernian history. The commissioners who report on the status of diseases in Ireland, relate that long prior to the erections of the hospice of the ecclesiastic, there existed homes for the sick and wounded of the Emerald Isle; for when the regal residences of Tara and Emania existed, there was attached to the latter the "Teagh na Craibhe Ruadhe", or "House of the Crimson Branch", where the warriors of old hung up their arms and trophies; and near to this stood the "Broin Bearg", or "House of Sorrow", where the sick and wounded were provided for. Thus, before the introduction of Christianity into this island, we read of a building being set apart for the maintenance and recovery of the wounded and diseased.

In later times, when an epidemic cutaneous disease overspread this kingdom, in common with most of the countries of Europe and Asia, hospitals dedicated to St. Lazarus, and subsequently bearing his name, were erected for the isolation and maintenance of persons affected therewith; traces and traditions of which have descended to the present day. The Celtic manuscripts contain many references to leprosy and lepers in the middle ages; but these notices chiefly refer to miraculous cures, said to have been performed upon persons affected with that disease, or to the districts and places set apart for their abode.

The present "Leper Hospital" of Waterford, the establishment of which has been attributed by tradition and the local histories to king John,—was originally used for persons labouring under the disease the name of which it bears. There was one leper in it in the year 1775, and that is the last instance of the kind recorded in this country.

Archdale, in his *Monasticon Hibernicum*, gives an account of the following institutions of this nature.

The hospital of St. Stephen, at Waterford, was founded for lepers, and endowed by the Power family. This hospital must have been erected before the Benedictine abbey, for John, Earl

of Morton, in his charter to that abbey (A.D. 1185), confirmed the leper-house to the poor of the city.

About the end of the twelfth century, according to the commissioners, Alured le Palmer founded an hospital for the sick, in connexion with the priory of St. John the Baptist, in Thomas Street, Dublin; an institution similar in character to the hospital in connexion with the priory of St. Bartholomew, in London, erected by Rahere in 1102. In 1374, the king, "considering the exility of the house and its endowments, and the support of so many poor and sick as were maintained therein, ordained that the prior should, 'during our good pleasure', be exonerated from coming to the marshes with his posse and tenants", etc. "In this house", writes Archdall, "was an infirmary which contained fifty beds for the sick".

During the seventeenth century, the only provision made for the cure of the sick in Ireland, appears to have been intended for the soldiery. One of the historians of the period alludes to "the great hospital of Belfast", in which "there were 3,762 that died in it from November 1st to May 1st, as appears by the telling given in by the men that buried them.

The first modern civil hospital in Dublin was opened in 1726, by six medical men of that city, in Cook Street, and was capable of accommodating four intern patients. It was removed to the Inn's Quay, and is now located in Jervis Street, from which locality it takes its name.

Afterwards the sick hospital took, as it were, a new phase; but for its origin, without reference for the moment to its usefulness or uselessness as an institution, we are undoubtedly indebted to the hierarchy of the Catholic Church. This origin gave weight to the institution, sanctity at one time, and privileges of no mean stamp at all times. The hospital became a kind of church itself, against which, even to these days, the whole army of tax collectors, notwithstanding their increasing encroachments, have not dared to raise a finger.

There is no very clear historical evidence when the Faculty of Medicine was first recognized as of service in hospital practice. In the Palestine hospitals in the chivalrous era, the knights and brothers were the chirurgeons, and in imitation of more ancient heroes, these bound up wounds and invented balsams. The famous *Baume de Commandeur* is a specimen of a cure-all of those days.

The first known hospital to which physicians were attached, belonged to the Templars, under the government of John de

Lastri, who in 1437 undertook the office of grand-master, and defined clearly the duties of physician and surgeon. The application of the sick hospital to the purpose of practical instruction for students, seems to have been established in connexion with a monastery of some Nestorian priests in a town of Persia, called Gaudisapora. Here a medical school was established as early as the seventh century, and became very famous. It is probable, however, that priests only had command of the hospital, and that students were allowed only to visit the sick as learners under the priests; inasmuch as they had to qualify themselves by submitting to the reading of the Psalms of David and the New Testament, and since many of them in later life rose to important ecclesiastical positions. Such is an outline of the origin of the sick hospital, and of its appropriation to the two purposes of treating the sick poor, and educating the Esculapian brotherhood. The project, at the first benevolent, has never lost an iota of the benevolence of its intention, though it may have lost much of the enthusiasm and the romance that marked it in the early periods. In respect to the benevolent intent, the project was excellent. In respect of action, it has been throughout a partial failure and a partial success. A great many lives have been saved by hospitals, a great many sacrificed. The balance is a fine one; we would fain put on the blind of justice while we take it.

As it was in the beginning it is now. Ages have worn away, and generations of the whole earth have died since the sick hospital arose near the homes of men. A grand fundamental mistake of the fathers pertains to the sons. Still, wherever human dwelling places have been most thickly set, the hospital has appeared at hand or in the midst. Nay, the rule has exceeded its origin; for now the sick hospital, limited in its own area, and surrounded by miles of living men, who look towards it as the focus of all their unnecessary and induced physical infirmities, stands bathed in the breath of the uncleansed million, a last mark of an effete barbarism and an age of charitable superstition. We close the windows of this enclosed refuge, and it is forthwith poisoned from within. We open them, and it is forthwith poisoned from without. We place hardy plants within its walls, the plants die. We place sick men in its wards, and we expect them to recover. It is strange, how the minds of men cling to origins. It is not until this age, that true ideas of the true meaning and use of the sick hospital have become known. Even this age is awakening but slowly to knowledge in this

regard. The hygiene of hospitals is, as yet, an open subject for discussion, and not altogether a safe subject for those who open the debate. Throwing overboard, for our own parts, all fears of this nature,—all old prejudices, born almost with us and nurtured, certainly, through every day of the student life, —we shall approach this question of hospital hygiene with that freedom which it is our right and duty to exercise in the sphere of our public labours.

It will be gathered from the above, that we consider the present sick hospital system in need of some great and radical reform. It is true; and the points we would urge in the way of this reform are—

1. That intramural hospitals are, in a sanitary point of view, a mistake.
2. That the construction of hospitals, in this country, requires to be immensely simplified and immensely improved.
3. That hospitals for certain specific disorders are, under their existing conditions, charities seriously misapplied.

In relation to the existence of our present intramural hospitals, especially in large towns, the arguments in their favour are two in number. The first is, that the hospitals are standing. The second, that the hospitals are convenient for the sick poor. The first argument is one that need not, to say the most, be perpetuated. The second argument, twenty years ago, when conveyance was difficult and costly, was irresistible. It is feasible even now. Another ten years and it will be a fallacy altogether.

The arguments *against* intramural hospitals are, first, that such hospitals are deprived of all the advantages arising from a constant renewal of fresh and pure air; secondly, that they do not receive the full share of the sunlight; thirdly, that the limited space allotted to them in proportion to their size enforces the necessity of a vicious system of construction; and fourthly, that the deficiency of airing and recreation grounds prevents the application of two of the most effective remedies in the treatment of disease—exercise and pleasurable recreation. The fact that the rural hospital presents a lower mortality than the urban hospital has long been recognized; but in England, as a statistical question, this matter demands a more rigorous investigation than it has received. The *Medical Times and Gazette,* in a late endeavour to encourage the construction of rural hospitals, gives from Dr. Farr the following table:—

FOUR RURAL HOSPITALS.

| Hospitals. | Dates. | One year. In-patients | Mean No. of In-patients | Deaths. | Per Cent. | Dths. in 36 days out of 160 Patnts. |
|---|---|---|---|---|---|---|
| Salop . . . . . | 4 yrs. 1830-33 | 955 | 92 | 34 | 3·7 | 3·6 |
| Winchester | 1 yr. 1833-34 | 798 | 83 | 31 | 3·8 | 3·7 |
| Salisbury . . | 1 yr. 1833-34 | 894 | 88 | 27 | 3·1 | 3·1 |
| Chester . . . | 2 yrs. 1833-35 | 489 | 45 | 20 | 4·2 | 4·5 |
| FOUR CITY HOSPITALS. | | | | | | |
| Manchester | 1 yr. 1831-32 | 1,784 | 128 | 128 | 7·2 | 10·0 |
| Liverpool . . | 1 yr. 1831 | 1,960 | 220 | 109 | 5·6 | 5·0 |
| Bristol . . . . | 1 yr. 1828-29 | 1,483 | 195 | 160 | 9·5 | 8·2 |
| London . . . | | 18,740 | 2,191 | 1,605 | 9·0 | 7·6 |

The table is instructive, but must be received, as our contemporary observes, with proper qualification; for the mortality varies according to the size of an hospital, being greater proportionately in the larger than in the smaller hospitals, and being very much modified by the occurrence or the non-occurrence of accidents or of epidemic visitations in its neighbourhood. On the subject of salubrity, Mr. Roberton speaks with his usual precision. He shows that an unhealthy hospital will unquestionably exhibit a high rate of mortality, but that a high rate of deaths is not always a correct test of the sanitary condition of the building. Thus in a town where people are much employed in machine shops and foundries, the hospital *there* will be sure to receive a larger proportion of severe casualties—of cases likely to swell the death rate—than will happen in another town where few are occupied in connexion with machinery.

The first thing to be regarded, according to this author, in an inquiry into the good or bad sanitary state of any hospital, is, the health of the resident officers and nurses. The second and more decisive test is the tendency in wounds received by accident or by the knife of the surgeon to heal speedily or otherwise—to heal or not to heal as quickly as would happen were the same cases treated singly in a commodious private house.

We agree with Mr. Roberton in his opinion as to the mode of inquiry into the salubrity of hospitals, and maintain that it is by such standards that the relative merits of the rural and town hospital are to be ascertained. And, if this test be admitted, the relative merits of the two classes of hospital can easily be given. The statist's work may, it is true, not appear, but the general experience of the surgical and medical world is

too decided in favour of the rural hospital, despite its indifferent construction, to be for a moment gainsaid. Nothing, indeed, is more lamentable than the history of the epidemic outbreaks which now and then visit our large hospitals, and the mortality after surgical operations in hospital practice. The report of the commissioners into the sanitary state of the army brings out important proof of this. In his evidence as to the condition of Guy's Hospital, Dr. Steele states that in the surgical wards pyæmia and erysipelas are common visitants. But Guy's Hospital is by comparison one of the healthiest urban hospitals.

We need not push this point further; for it is but to question the common sense of mankind to press into notice the facts, that where flowers bloom and all nature rejoices under the light of the lifegiving sun; that where landscape and skyscape alike rivet the eye and gladden the heart, that there the halting traveller between life and death will find a better haven, than in a dreary corridor with neighbouring misery for his constant companion, with no diversion for his wearied thoughts, with not one moment of fresh breeze to fan his brow, with light half extinguished and landscape and skyscape shut off by miles of brick screen work, and with air for his breath the very presence of which is poison to the hyacinth or the rose.

To make our great hospitals what they ought to be, not a slight on this age but an honour to it, their removal out of the busy city is the first desideratum. But there is yet a kind of perverse idiotcy amongst hospital builders. Instead of looking for a hospital site that shall give to every patient half an acre of ground, your utilitarian charity hospital founder buys half an acre of ground, covers it with brick, and then calculates how many persons he can decently stow into his building, so as to swell his charity to splitting point. He adapts the man to the ground, instead of the ground to the man. His perversity goes further. He looks out in the heart of the great city the most densely populated, most poor and most occluded part, for the small spot which is to be so charitably stocked with sufferers, and advertises daily in the *Times* and elsewhere, to mention nothing about what he says at public dinners, that therefore and because this neighbourhood is so dense and so miserable, so is a hospital required in the centre of it, that misery may concentrate. To make the charity more imposing, he adds massiveness to his scheme. Everything must be massive. The building an enormous mass, strong at base and built very high into the heavens, because into that vault charity extends cheaply in the shape of brick and mortar. His

expenses must be immense, £60 per day at the least. His servants must be an army; his advertised admission list of patients per year a veritable county of no mean size. Step forward, my poor friends, step forward into the health mill and through it. Out of it "cured, relieved, unrelieved or dead." This is an institution that refuses none, except when it is chokefull and no more beds can be improvised.

To be a holder of extensive charity shares in a leviathan institution such as ours is to belong to something extensive, says the self-satisfied charity promulgator. Extensive certainly! but extensive in a way that is false to sanitary science, a farce to true philanthropy, a something in which pure charity is least visible, a mere sounding brass and a tinkling cymbal. For what is the object of a hospital which is the refuge and generating point of diseases from which no art or science can rescue the victim? What would be said of a hospital in which the officials are allowed to breed in certain of the wards a race of hydrophobic dogs to lick the wounds of the wounded and keep up a mortal scourge? What would be said? why just what ought to be said to those hospitals where pyæmia and erysipelas are allowed to breed in certain wards and inflict a scourge on the wounded as mortal as mortal mad dog could implant. What should be said? Why, that if these pests are not removable from the ward, then living men, wishing to be cured, should not be moved into such receptacles, and that the grand semblance of charity should be removed at all risks, that the simple reality may be sustained.

Hospitals for large cities to be of unmistakable value to the poor populations, in obedience to sanitary science, and the fundamental laws of the healing art, can only exist in suburban situations. Receiving houses, in connexion with the extramural hospitals, should certainly remain in the town for the temporary reception of accidents; and dispensaries might continue, for giving advice and prescriptions to the sick poor resident at their own dwellings; but the hospital, with its bed-stricken population, has no more business to be crammed into a city than a city has business to be crammed into a hospital.

The first hospital reform, truly hygienic in character, is then, we repeat, removal to an extra urban site. The next question relates to construction. The construction of a hospital has engaged the attention of many thinking men. The views of different men seem, at first sight, to be very conflicting; but, on close analysis, there is really but very little difference in principles. There is now an almost universal acknowledgment that ample space around the hospital is an

essential part of any new system. We believe ourselves that the primary consideration in the selection of hospital sites, is to secure such ample grounds about the institution that every hospital having one hundred beds should stand in a plot of favourable ground of at least fifty acres. The soil should be gravelly, and the products of vegetation abundant. The grounds should be laid out artistically, so that the mind of the convalescent man may be constantly in contact with interesting and pleasing objects. The hospital itself, in lieu of being built in one immense edifice, should consist of separate blocks distinct from each other, and each containing at most three wards. The wards themselves should in no way communicate with each other, but be entered by doors communicating indirectly with the open air. The wards should have windows facing each other on all sides, so that currents of air may find their way through and through in all directions. The windows should reach from the bottom to the top of the wards, and should be as numerous as the beds contained in the ward itself. The beds in each ward should not exceed twenty in number, each bed having at least 1,500 cubic feet of air. By a covered passage, each sleeping ward should communicate with an extra room, for daily use, so that the patient might be removed in the day from the room he has occupied during the night. The latrines, as Mr. Roberton observes, should be joined with the wards, so that the sick can pass into them without risk of taking cold, and so placed as to have no ventilating communication with the ward. In St. John's Hospital, Brussels, the latrine is entered from the ward by two doors, an inner and an outer, and the latrine forms a separate building. For purification, the seats are against the outer wall, and the position of the two windows secures a thorough ventilation of the apartment in a direction at right angles with the passage from the ward into the latrine. These arrangements are considered by Mr. Roberton as perfect in their way. The removal of the soil of the latrine is imperative, and for this purpose the self-acting water-closet is much best. It secures permanently a cleansing which would too often be omitted if left to the will or judgment of different persons.

In some hospitals the stench arising from the dressing of wounds is removed, by a contrivance for suddenly flooding the ward with air, and making the current of air to sweep from above downwards and outwards, by openings in the lower part of the wall of the ward. We quote from Mr. Roberton's ventilation the following account of this very useful proceeding :—

"Capped tubes, penetrating the walls a few inches from the floor, are used in Continental hospitals for the occasional ventilation, or, more correctly, for the occasional flooding with air of a particular part of a ward. This contrivance I noticed for the first time in the Hospital de Bairer, Liege. Every surgeon knows, when the dressing is removed from a burn, a wound, an ulcer, or an abscess, that, sometimes, the fœtor is intolerable; and the same will happen in certain states of disease, when the patient is on the bed pan. How it is in such circumstances, by uncovering the mouth of a tube, four inches in diameter, communicating near the floor with the external atmosphere, and the locality is instantly flooded with fresh air, and that, too, at so low a level as not to incommode the patient; when a tube in the opposite wall is at the same moment uncovered, the flood of air is such as allows of both tubes being speedily closed." (p. 10.)

In France, this plan of abstracting the air from the lower part of the ward—*i. e.* from below the level of the patient's bed, instead of above—is becoming exceedingly common. The claims made for this arrangement are thus summed up by Dr. Sutherland, in his note to the army commissioners, on the ventilation and warming of the Parisian hospitals:—

"It is presumed, by arranging the apertures for the exit of foul air near the floor, that emanations, of whatever kind, proceeding from the sick are prevented from becoming diffused through the air of the ward, and that they are directly carried away from the sick bed, that each patient is enveloped in an atmosphere peculiar to himself, and that in cold weather the lower and colder strata of air in the ward are removed, instead of the higher and warmer strata, which would be the case if the ventilating openings were near the ceiling. In proof of the importance of this point, the well known fact of the higher temperature of the upper strata of air in apartments ventilated from the ceiling is adduced. Thus, in one of the minor theatres of Paris so ventilated, the temperature of the air on the level of the floor was found to be 18·36 cent., and 34·52 cent. at the height of 21 feet, showing a difference of 27° Fah.; while in Lariboisière the temperature is the same throughout the whole cubic contents of the ward. The practical result, as regards the sick, of this method of ventilation is stated to be,—

"1. The disappearance of the odour peculiar to sick wards, especially in those containing wounds.

"2. The complete disappearance of epidemic erysipelas, hospital gangrene, and phagedæna, while these diseases still show themselves in wards which have not been ventilated in this manner."

There are three methods for ventilating in this manner, each of which provides for warming also. These are the methods of Duvoir, of MM. Thomas Laurens, and Grouvelle, and of Dr. Heicke. We have described the principle of these plans in previous numbers of this *Review*.

The report of the army commissioners contains records from upwards of sixty hospitals, relative to the different modes of ventilation adopted in hospital practice; and scattered throughout the report are numerous estimates as to the amount of air which is, or ought to be, supplied by certain artificial systems. One inventor boasts that he can give 2,500 cubic feet of air per bed per hour; another, more. Various witnesses also explain that a certain amount of cubic space, 1,500 cubic feet being the most approved figure, are required per bed in the hospital. We agree to this latter proposition, but to the former have only to say that when one man begins to measure out air to another man like a yard of broad cloth, his science is far ahead of his common sense. A ward with windows on each side and at each end, and with a good open fire-grate, requires no measurement of air, nor pump, nor fan, nor steam-jet, nor heated pipe, nor meter trap. The air will blow as it listeth, and ventilate in its way. But it is an advantage to natural ventilation to have a small ward through which the air can circulate freely, and be renewed without cessation.

The mode of artificial lighting of hospitals is a point insisted on by Mr. Roberton, who objects strongly to gas, on account of occasional escape and the glare of the light, and who prefers the oil-lamp. The question of artificial lighting altogether requires remodelling; in hospital, we agree that the oil-lamp is much preferable. One or two moderator lamps in each ward would be found to answer all purposes, and be much less hazardous. The great point, at the same time, to be kept steadily in view in the sick ward is, to do away as much as possible with the artificial light altogether, and to make the patients conform to the eternal law that man shall be the waking and the sleeping companion of the glorious sun.

Regarding the walls, ceilings, furniture and accommodations of hospital wards, the evidence of Miss Nightingale, to which we would especially call the attention of hospital reformers, is as follows :—

"*Qy.* 10,029. What is the best material for the flooring of wards, and your reasons for preferring one material to another?

"The materials used for floors may be oak wood, pine wood, composition, and tiles. Oak wood, well seasoned, is the best. No sawdust, or other organic matter capable of rotting, should be placed underneath the floor. Concrete, or some similar indestructible substance, would be the best for the purpose. The reason for using oak wood is, that it is capable of absorbing but a very small quantity of water. And it is very desirable to diminish even

that capability, by saturating it with beeswax and turpentine. Beeswax is an unalterable substance. It is also desirable to avoid the necessity of washing the floor as much as possible. The joints of the flooring must be fitted well together, and cemented with marine glue, or any other impervious substance. The object is, of course, to prevent any water from entering the floor. Impervious, non-absorbent cement, or composition, would make a capital floor, used as it is in Italian houses. But, on account of its great conducting power, it would be necessary to furnish each patient with a pair of list-shoes, and a small bedside carpet. The stairs and landings should be of stone. The corridors should be floored with diamond-shaped flags or tiles, which stand better than those laid in the usual manner. The terrace might be either covered with asphalte or glazed tile.

"10,030. What accommodation for nurses, extra diets, clothing, and clean linen should be attached to the wards?

"There should be a nurse's room, clothes room, a small diet kitchen, and also a store attached to each ward. It is, perhaps, hardly necessary to add that there should be a few small wards for operation cases, and for noisy fever cases.

"10,031. What kind of baths should be attached to the hospital?

"The baths should be separated from the pavilions, but connected by the corridor. The walls and ceilings should be of Parian cement, or some similar material; the floors of tile. They should be suitably ventilated and warmed. They should contain hot and cold water baths, sulphureous water, hot air, medicated and vapour baths and douche. There should be a portable bath to each ward.

"10,032. What is the best form of hospital kitchen?

"The kitchen should be placed away from the wards. Its walls and ceiling should be of Parian cement, for plaster has a tendency to fall off, from the vapour and effluvia of the kitchen. The cooking apparatus, boilers, etc., if placed in the centre of the kitchen, instead of against the walls, will afford twice the amount of fire space. In the Paris kitchens there is a brick erection in the middle of the floor, with iron doors and brass mountings, coppers with covers, places for baking and for roasting, etc. The dressers are against the walls. The floors are flagged with square flags. This appears to be the most convenient mode of erection.

"10,033. What is the best form of laundry for a hospital?

"The excellent new washing, drying, and wringing machines, lately invented, are so numerous that it would take too long to enumerate them. On the whole, the laundry at the Wellington barracks, which also washes for all the Guards' hospitals and barracks, and the new laundry at Haslar Naval Hospital, are the best I have seen. But every day brings in fresh inventions, and a reformer is always adopting the good ones. It is a further question in army matters, whether you should train a body of men to do as much

as possible by hand, so as to be serviceable in the field, where machines cannot be had, or whether you should make use of all the inventions for saving labour, which are now so good, and daily improving. Probably both must be done.

"10,034. How should nurses and orderlies be accommodated?

"If orderlies are to sleep among their patients, the percentage of mortality will be, of course, raised among them. This was the case at Scutari, where it was very high, though it will never be known how high. Statistics are, however, not necessary to establish such an obvious fact. The orderlies should sleep at a distance from the wards, and not take their meals in them. With regard to the female nurses, there is the further question as to what class of nurses should be employed in military hospitals. My own opinion is humbly but entirely against employing any but women of the efficiency, responsibility, and character of head-nurses in civil hospitals. For such a nurse a small airy room off her ward, but so that she can always have it under command, is the best for her efficiency, and need not be injurious to her health. Unless, however, there are facile means of access to another nurse's room, in case of illness, there must be only a day-room for each head-nurse adjacent to her ward. She must sleep at a distance from her ward, but contiguous to the other nurses. If assistant female nurses are employed, it must be considered that association in large dormitories tends to corrupt the good and make the bad worse. And separate accommodation, or accommodation for two or three together, should be provided contiguous to the ward, if possible, if not, to one another.

"10,035. What kind of bedstead and bedding is the best?

"No bedding but the hair mattress has yet been discovered that is fit for hospitals. Hair is indestructible. It does not readily retain miasma; and, if it does, heat easily disinfects it. It may be washed. It is not hard to the patient. It saves the objectionable use of a blanket *under* the patient. Straw paillasses are absolutely objectionable. They are cold; and, in some cases, the abstraction of heat from the spine lowers the patient's vital energy to a degree which does not leave him a chance. I am of opinion that the loss of life must have been great during the war from laying our patients on paillasses, which were either placed on wooden divans, or on the flagged corridors, with only a mat between. The bedstead should be iron; and there are great differences in the way the sacking is put in. There should always be a shelf at the head. The French have one at the feet too. The naval and civil hospitals have all kinds of dropsy and surgical bedsteads for raising a patient when he cannot be moved, for inclining him at a certain angle, etc., also water and air beds. There is no reason, but a general objection to comfort, to prevent us using these bedsteads in military hospitals.

"10,036. What ward furniture would you recommend?

"Oak furniture, decidedly. White window curtains are used in

some French hospitals, not to exclude the light, but to look cheerful. They are desirable, but not necessary. The less ward furniture, speaking generally, there is the better. But if it be desired by the Commission, I will put it in a list of what is absolutely necessary. Hitherto, as is well known, a military patient has been expected almost to furnish his own ward." (*Commissioners' Report*, p. 382, 383.)

The draining of hospitals and the water supply are equally important questions with those which have gone before. No main drain should pass under the building. Every drain from the building should be kept constantly washed by continuous water-flow and trapped at its outfall. Water derived from a source uncontaminated as far as it can be secured should be at hand in every ward, but procurable only from the original source; or if retained in cisterns, retained in pure cisterns, and of all things again not in cisterns of lead.

As regards construction, the grounds surrounding the model hospital must not be forgotten. These, laid out with taste, should allow of every possible kind of innocent recreation for the convalescent. Gardening, walking, simple games, these are essential. Glass covered walks for wet days are requisites; and miniature tram roads for the easy conveyance into the pure air of the patient unable to leave his bed, these little conveniences are essentials in the true hospital sense, simple though they may appear in themselves. Were proper accommodation made for the conveyance of patients necessarily confined to their beds out of the sleeping ward into the day ward by means of moveable beds, advantages would follow not easily to be described. At the present time, in fact, absolute mischief is done to the sick hospital patient by the circumstance that owing to the necessary limitation of space he is confined almost exclusively to his bed, even though his own instinct and the practitioner's knowledge alike intimate that constant bed is not the treatment. The usefulness of a large hospital would be doubly enhanced as regards admissions if the lingering cases could receive the hygienic treatment of gentle exercise, and if convalescents could secure rapidity of convalescence by the same all potent restorative.

We have neither space nor inclination to dwell at length on the evils of special hospitals as they now exist. Hospitals in which numbers of fever patients or of smallpox patients are all sorted and linked in the bond of residence together. Such hospitals were really too absurd for scientific discourse, were they not concerned in the progress of humanity. They are like the old goals, where the grossest and the mildest of felons were

once put together for mutual improvement by more intimate conversation and life. Some of the special diseases of special hospitals are diseases which originally, and as it were naturally, spring up in all localities where air is confined, and the living inmates are numerous and inactive. Enough of this. If correctly built hospitals in rural situations were instituted, special cases would become general, and the treatment which common sense should dictate be secured. Haply then, we might see the typhus-stricken man wheeled out under the open sky, and made to inhale a more certain remedy than ever yet therapeutist gave by mouth, in shape of opiate, salt, or metal.

We have done—yet not for a moment; for the thought will out. In hospital reform lies the whole question of medical scientific reform, which we have so often urged. Why is the arena of medicine such a scene of loud and irregular disputation, broken in upon and in corners ignominiously driven deaf by the voice of quacks and impostors of every grade and kind? Why such a Babel, with each man crying "Eureka", giving to his neighbour but little attention, and expecting not overmuch himself from the moment of his first declaration? Why the clamour?—Because at the great centres of medical education and observation the great facts relating to diseases and their treatment are seen through a haze, and learned loosely in the midst of confusion. Before medicine can stand out immortally and inapproachably, she must give up much, forget greatly what she hath learned, and learn less in a new way. Give up the artificial, pick up the natural, and realize that mere physic is like the operator's knife—the opprobrium of the art.

Thirteen years ago, in the very large hospital of a very large city, there broke out suddenly in the wards, a virulent epidemic of a disease we have already noted—pyæmia. The surgeons put up their knives in fear, and well they might, for to lop off a limb in that building was to put out a life. Out of the hospital, however, in the streets of the city (not a very healthy city, by the way), the surgeons operated as usual and without risk more than common. So the pyæmia had, clearly, a hospital origin, and would not have been in the city but for the hospital, nor in the hospital but for some defect in the hospital itself. The physicians of the hospital, and the surgeons, and the house-surgeons, and the dressers, and the students, and even the nurses, said, What shall we do (not to strike the plague) but to cure the plague-stricken? At the right moment, *i. e.* when confusion was at its highest, one of the house-surgeons, fired by an incomprehensible thought, cried out,

"Try lead." The physicians and the surgeons, catching at shadows, tried lead, therefore, on the spot. The apothecary walking round with the physic basket, dispensed the acetate of lead with liberal hand, and the pyæmics, drawing in long breaths of pyæmic air, took in lead pills by the stomach as the antidote. Whether the lead did good or evil cannot be told; or whether even if a patient had recovered the pyæmia, he would have been affected with after wrist drop, cannot be told, for the poor pyæmics died. But a little later, and a supply of air, improved in quality as in quantity, having been admitted, the pyæmia fled. This event gave rise to the famous local controversy on "Lead *v.* Air, in the Treatment of Pyæmia"; which controversy being scarcely decided as yet, in some quarters, is left with the reader for entire settlement.

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## THE SOCIAL SCIENCE TRANSACTIONS.

THE formation, last year, of a society for the study and cultivation of social science, formed an important epoch in our national history. The society met at Birmingham, under the presidency of Lord Brougham, and supported by many of the wisest and best of the land, it passed off with all that success that could be expected from it, and with even more success than was anticipated even by its founders. The department of public health, presided over by Lord Stanley, possessed to us most interest. The Transactions of the society, now in our hands, indicate how ably this department was sustained.

The sanitary papers before us are too numerous to admit of complete analysis, and too compact to allow of condensation. Instead, therefore, of giving either analysis or epitome, we select for our readers, from certain of these papers, such parts as we think will afford them most information. The admirable address of Lord Stanley has been commented on in the present number, in the report of the council of the Epidemiological Society.

*Districts and Death-Rates.*—Dr. Headlam Greenhow, in a paper on "The Analytical Study of the Statistics of Public Health," supplies the following:—

"There are districts in England and Wales which, in point of salubrity, occupy every possible intermediate position between the unhealthiness of Liverpool and the healthfulness of the rural districts with which it has here been contrasted. As a general rule, large towns commonly present a high death-rate. The public health of smaller towns and of rural places is, for the most part,

comparatively good. This remarkable difference between the state of the public health in different districts—a difference that is rarely caused by the climate, position, or natural character of the places—has been usually, and I believe correctly, ascribed to adventitious circumstances incidental to human occupation, and especially to the rural or urban character of the districts. This general inference has been made the basis of all arguments in favour of employing measures for the amelioration of the public health of towns, the insalubrity of which has been, perhaps too hastily and exclusively, attributed to a few only of the most prominent evils to which urban populations are exposed.

"The diseases by which the larger mortality of unhealthy districts is occasioned, have also been hastily inferred from data equally incomplete. The diseases to which the term 'zymotic' is applied are usually believed to be the chief causes of the excess of deaths in unhealthy districts; and the term 'zymotic disease' is often, and without qualification, employed almost as if it were synonymous with preventable disease. The incorrectness of such language may be well shown by a single illustration. The term 'zymotic' is, perhaps, most correctly applied to those diseases which, being produced by a special poison, are capable of propagation by contagion. The infinitesimal drop of smallpox lymph, or the inappreciable contagion of scarlet-fever, is not only capable of exciting these diseases, but sets up an action in the body which may well be considered as a kind of fermentation, since one of its results is the formation of a similar poison capable of exciting the special disease, but in a quantity immensely greater than the amount originally received. However we may speculate upon the original cause of these and analogous diseases, we are now only acquainted with them as the consequence of being brought into immediate relation with a poison generated in the bodies of the sick. As has been alleged of certain diseases of cattle, they may have originated among a particular race of men exposed to peculiar conditions, and spreading from this origin—the conditions necessary to their spontaneous production having ceased—they are now propagated by means of contagion. Certain it is, that we are unacquainted with any other mode of preventing them than the exclusion of their special poison. The admission of any of these poisons to a person unprotected by a previous attack of the disease—for it is a common quality of these diseases that one attack very greatly diminishes the liability to a second—rarely fails to induce the disease, whatever the sanitary condition of the district in which he may reside. Again, how can we hope to prevent certain epidemic diseases, as dysentery, influenza, and fever, which evidently depend upon causes that, generally diffused over infected districts, act upon large numbers of persons, irrespective of residence or of sanitary condition? It is, indeed, true of several of these diseases, that the adoption of precautions, and particularly of such as are calculated to maintain the purity of the atmosphere, will render the

dwellers in particular districts less liable to suffer severely from the epidemic influence. Thus, whilst the *amount* of the disease may be equal in salubrious and insalubrious places, its *intensity* may so greatly vary that the same epidemic which causes but little inconvenience or danger in the former, may prove of pestilential severity in the latter. Visitations of epidemic disease are, however, only of occasional occurrence. However formidable may be their ravages at the time, when the mortality occasioned by them is subdivided over a series of years it adds but little to the average general death-rate, which, nevertheless, continues chronically high in some places, and permanently low in others." (p 368-9.)

*Sewerage of Towns.*—Mr. R. Rawlinson, in a paper on the above subject, gives the subjoined conclusions :—

"That natural streams down valley lines should never be converted into sewers.

"That all valley lines should be improved to admit of the escape of surface water in a natural manner.

"That sewers should be graduated so as to remove roof, yard, street, soil, and subsoil water from the town.

"That house-drains should remove all subsoil, surface, and slop-water from houses into the sewers.

"That all sewers should have flood-water overflows connected with valley culverts, so as to lead such surplus into rivers or streams direct or for filtration and disinfection.

"That all sewers should be fully ventilated. That there should be easy means of inspecting and full means for flushing, cleansing, and repairing.

"That where new works have to be set out neither sewers nor drains should enter nor pass between inhabited buildings, and that there should be full means for external ventilation at the upper ends of all drains, outside the walls of buildings. Any sewers or drains existing under houses should be air-tight and fully ventilated, so as to prevent a possibility of internal gaseous contamination to such house or houses.

"That sewers should not join at right angles. But that tributary sewers should deliver sewage in the direction of the main flow at an angle never greater than thirty degrees.

"That sewers at all curves, or change of direction, should have extra fall to compensate for increased friction.

"That all sewers and drains should be laid in straight lines and at true gradients from point to point. That at each change of line or gradient there should be means of inspection and of cleansing provided by manholes and lampholes.

"That sewers should never join at the same level, but that the tributary sewer should have increased fall at the junction with the main sewer.

"That all junctions of branch sewers and house drains should be above the ordinary level of sewage flow in the main sewer, and

that branch sewers and house drains should have extra fall before and at the point of junction.

"Earthenware pipes above twelve inches in diameter need not be used, as, in general, they are more expensive than brick sewers one-half larger in sectional area.

"All bricks for sewers should be moulded to the radii required. They should be hard and vitreous, free from lime, and such as will endure great wear.

"The best hydraulic mortar should be made and used fresh, so as to produce sound and lasting work.

"Earthenware pipes of equal diameters should not be joined, but the lesser should join the greater, and there should be extra fall at the junction.

"The inlets to all pipe drains should be guarded by a trap or by means which will not allow any substance of diameter equal to the full bore of the pipe to be inserted.

"At all manholes there should be means of flushing, as also in all flat districts and at the upper ends of branch sewers and tributary drains.

"Sewers and drains act as land drains to the full depth to which they are laid. In wet subsoils this should be considered in settling the sectional dimensions of sewers and drains.

"Sewage may be discharged into rivers, and into the sea, without injury to health, if proper means are used to dilute or to filter and disinfect the fluid refuse.

"Sewage, under certain conditions, may be applied to land for agricultural use, so as to be the cheapest mode of disposing of the same.

"Large volumes of sewage should not be concentrated and poured out at any one point. Several points of discharge, as wide apart as possible, will allow of fuller dilution.

"A duplicate system of sewers cannot be necessary under any circumstances. If there are natural streams they must not be used as sewers.

"It may be stated generally that town sewerage is practicable. That is, sewers which will perform the required work can be executed, and at a cost within the means of the poorest body of ratepayers." (pp. 43-45.)

*Hygiene and Military Education.*—Sir John Richardson, speaking on this subject, says:—

"It might be expected that a people whose humanity is vaunted, whose knowledge of science is equal to that of any other nation, and whose means are inexhaustible, would at home, at least, and in our colonies, take care that the lives of our defenders should not be wantonly thrown away by placing barracks in the focus of disease, or neglecting to provide the necessary appliances for cleanliness and sufficient ventilation and drainage. Even the money value of the men annually sacrificed by this neglect forms

no inconsiderable item in the national expenditure, and ought long ago to have incited the war authorities to invoke the aid of science for the mitigation of this evil. But what is the actual state of the case? Take our West Indian Colonies, for instance, and it will be found that the rule has been to place the barracks in situations unusually exposed to malaria. St. Vincent and Demerara are, I believe, the only exceptions, and in one of these the construction of the buildings is unsuited to the climate. At Barbadoes, the iron barracks, were contrary to the advice of the chief medical officer, erected in the lower part of the Savannah, near the burying-ground, and on outbreaks of yellow-fever it has repeatedly been found necessary to move the troops to an encampment in a higher and more airy and healthier locality. At home, many of our barracks and public hospitals are badly ventilated, ill-provided with the means of preserving the comforts and decencies of civilization, deficient in a supply of good water, situated near the deposits of the excrementitious matters of large towns, and surrounded by narrow lanes of the lowest kind of houses, the dwellings of the meanest and filthest members of the community. These evils are in part owing to a misplaced parsimony in the Government declining to allot funds for the purchase of the neighbouring grounds when a site is selected for an hospital or barrack. In consequence of this neglect, no sooner is a barrack built, than the vicinity is covered with slightly-built houses for lodging the families of the married soldiers, at a rent of one shilling or eighteen pence a week for each room, conveniences and drainage being the last things thought of. Low pot-houses also arise, and the classes that prey on the soldier and sailor crowd into the district, where their stews prove unfailing nurseries of contagious disease. Such places are still in existence in our garrison and seaport towns, though some have been recently reduced at a great cost, which might have been got in the first instance for a small sum. Had the engineers who planned and executed the public buildings to which I allude been conversant with the laws of sanitary science, they would scarcely have failed to urge a due attention to them upon the heads of the departments." (p. 450.)

*Air-Tight Coffins.*—Mr. J. J. Salt recommends for burial purposes an air-tight coffin, which is thus described:—

"The improved coffin referred to is made in the usual form and external appearance; the material of which it is composed is sheet zinc, strengthened at the edges by a bead of the same material; this bead is flattened at the top, and thus forms a broad substantial bearing for the lid, which is merely laid in its place and soldered to the flat surface of the bead.

"Besides its cheapness, this coffin possesses the further advantage of being lighter than the ordinary wooden one.

"The durability of sheet zinc is well known; it arises from the formation of a film of oxide on the surface, which is so compact

and uniform as to serve as a kind of protecting varnish to the metal beneath. Unless exposed to mechanical violence, or the action of corrosive acids capable of dissolving this oxide, the durability of zinc is so great, that there is every reason to believe that a zinc coffin, buried at a moderate depth in the earth, will last beyond the time required for the elements of the body to arrange themselves in such a manner as not to be liable to any further decomposition.

"It is the opinion of several practical chemists, of whom I have made inquiries, that a body hermetically sealed in such a coffin would not go through the ordinary course of putrefaction, as such decomposition consists chiefly of the combination of the materials of the body with the oxygen of the air; and that this decomposition takes place on account of the feeble affinities by which the elements forming the soft tissues and the fluids of the body are held together. When the small quantity of air enclosed in the coffin has given up its oxygen, this action could go no further, and changes of a different nature would take place; and the loosened elements of the body would, under these circumstances, arrange and re-arrange themselves into various compounds, which would go on changing until they at last formed substances such as adipocire, in which the elements are held together by more powerful affinities; that further chemical change would then cease, and such compounds, when once formed, would not be liable to dangerous decomposition by mere exposure to the atmosphere.

"Besides the safety this coffin ensures after burial, it will be of the greatest value in preventing the mischievous consequences that so frequently result from the decay of the body between the time of death and interment.

"Such coffins may be made of any size to order in a few hours, and the body soldered up in its air-tight case within eight or ten hours after death." (p. 455-6.)

*On Central or Local Action.*—In defence of the principle of central action in matters of local improvement, Mr. Tom Taylor argues as follows:—

"Reviewing what has been said, it will be found that the necessity of central action on matters of local improvement is maintained,—

"1. To confer powers for such improvement cheaply and effectually; to invest with the legal character of 'towns' areas of dense population not having yet acquired a known and defined boundary; and to fuse into a consistent whole existing local Acts, and a general measure of town improvement.

"2. When such powers are conferred, to forward generally the wise and efficient exercise of them by diffusing the light of a general experience, and by communicating the results of such special inquiries as the central department may be charged to make, by advising in cases of doubt or difficulty, and generally by assisting, but never superseding, local efforts.

"3. To protect posterity, by examining and deciding upon application for leave to mortgage rates.

"4. To report to Parliament on the exercise of local powers.

"5. To act as a court of appeal against local oppression in certain specified cases, and a court of *mandamus* in cases of local default.

"I have spoken of town improvement generally, for I conceive it impossible to pick out any particular functions of the town-improving authority which can be said peculiarly to concern the public health.

"Improvement in the health of a town population is the best evidence that the town is well governed.

"Neither have I made any attempt to enumerate the other duties distinct from those directly relating to town improvement, which a central department may perform for general enlightenment on hygienic questions, and to forward the infant science of preventive medicine.

"In conclusion, I would wish very distinctly to reiterate the opinion, that local improvement is primarily and specially a local duty; that the central authority, which should attempt to supersede the fulfilment of this local duty by local agency, instead of aiding, enlightening, and insisting upon its fulfilment, would be following a mischievous and mistaken course; and that unless it be found that central action is required to make local action efficient, there is no reason for keeping up its machinery and employing its functionaries." (pp. 480.)

*Prolongation of Life in the Eighteenth Century.*—Dr. Southwood Smith has an admirable paper on this topic. One or two passages are worthy of transcription into every periodical:—

"It is a matter of familiar history that in this country the spirit of improvement which had been awakened in the two preceding centuries, exerted itself with extraordinary activity during the whole of the eighteenth century. Already forests had been cleared, marshes and swamps had been drained, and from the more settled government of the country, cities and towns, being no longer fortresses, had extended beyond the walls of their fortifications. But precisely at this period special attention also began to be paid to the well ordering, cleansing, and paving of towns. The narrow streets were widened, great numbers of houses were entirely taken down and rebuilt, slate being substituted for thatch and brick for timber, while the manufacture of glass was so much increased that glass windows, even in the poorer houses, became common. The general result was to render the houses more substantial and commodious, and the rooms larger, higher, lighter, warmer, and better ventilated. Agriculture took a surprising start, multiplying a hundredfold the production of fresh vegetable food, and increasing, perhaps, in a still more remarkable degree, the amount of fresh

animal food, by the extension of the comparatively new art of collecting, storing, and preserving fodder for cattle in winter. The increased and successful activity of manufactures gave improved and cheap clothing to the people—clothing not only conducive to health through warmth, but almost equally so through cleanliness, for the articles of clothing now began to be composed of such tissues and textures as favour and compel frequent washing. At the same time disease in general assumed a milder form, and epidemics in particular became less frequent and far less formidable in their character.

"The combined operation of these causes goes far to account for so wonderful a change in the sanitary condition of the country as must have taken place before any considerable portion of the community could have obtained a lengthened life, equivalent to a fourth of its whole term.

"It is true these sanitary changes were effected without any knowledge of their sanitary nature or tendency, but they were not the less sanitary in their operation because that operation was undesigned and uncontemplated, nor because the changes in question were the pure result of the force of the onward current of civilization. . . . . .

"If the advancing civilization of the eighteenth century was accompanied by such a prolongation of life as we have seen was gained, what has been gained in the half century that followed—in the time in which we ourselves live? We cannot tell, because we have no record of definite facts to inform us. We know, indeed, that every sanitary agency that could have been in operation in the eighteeeth century has acquired greater energy in the nineteenth; that several powerful sanitary influences have been superadded, and that the main conditions on which life and health depend have recently experienced an expansion and improvement to which no former age presents a parallel." (Pp. 502-3.)

We must conclude with these few brief extracts. We regret it much. But the regret is softened by the fact that both the "Transactions" and membership of the Social Science Association, are open to all earnest men, anxious for the welfare of their kind, and the honour of their country.

# THE EPITOME OF SANITARY LITERATURE.

If the amount of literature supplied on any given subject or science may be received as an indication of national progress on such subject, it is obvious that sanitary science is rapidly advancing in these days. Our book list will show how large an addition to sanitary literature has this year been made.

Climate. Dr. Edwin Lee* has a small but neat work, entitled, *The Effect of Climate on Tuberculous Disease.* It contains the subject matter of an essay, for which the "Fiske Fund Prize" was awarded. Speaking of the treatment of consumption, this writer observes, while advocating the peremptory necessity of prescribing air, that an equable climate is not the most desirable, and gives notices of the following most frequented places of resort for consumptives:—Pau, Hyeres, Nice, Menton, Pisa, Rome, Naples, Palermo, Malta, Madeira, Malaga, Algiers, and Egypt. In these notices, he supplies important information relative to geographical position, climate, amusements, accommodation, etc. He is of opinion that the climate of Upper Egypt is more than any other calculated to render service to a large proportion of invalids from phthisis in the early stages.

Diseased Prize Cattle. The work of Mr. Gant† has excited very great attention in the agricultural world. The inquiry which he has instituted is, as he rightly claims, one of national interest and importance. He shows that the English method of feeding cattle is based on a vicious principle; that the present system of overfeeding leads to destruction of the muscular tissue, destroys the healthy action of the heart, and induces pathological changes, the recital of which would be sufficient to disgust the least delicate and fiercest appetite. With a boldness which does him immense credit, Mr. Gant, at the last Smithfield Cattle Show, followed up the labouring Prize Animals to their shambles, and after the butcher had performed the sacrificial rite, examined the bodies of these victims with a pathologist's knowledge. The diseased condition produced in these animals may be termed, says the writer, "conversion into fat, as expressive of the apparent change which has ensued; but on closer examination with the microscope, I would ascribe the change itself to the substitu-

* The Effect of Climate on Tuberculous Disease, with an Appendix. By Edwin Lee, M.D. London: Churchill. 1858.

† Evil Results of Overfeeding Cattle. A New Inquiry, illustrated with Coloured Engravings. By Frederick J. Gant. London: Churchill. 1858.

tion of fat (in the process of nutrition), for the proper structural elements—fibrillæ—of muscle, and not to the actual transformation of those elements into fat." He also adds,

"We should therefore expect in vain to replenish our own muscles by the use of such food, nor should animals thus over-fed be regarded as prize specimens of rearing and feeding. The heart, being converted into fat, no longer retains its contractile power, but beats feebly and irregularly. The blood, therefore, now moves onward in a slow and feeble current. Hence the panting breathlessness due to stagnation of blood in the lungs, which the heart labours (in vain) to remove, while the skin and extremities are cold. Hence the stupid, heavy-headed expression of a congested brain, and the blood-stained appearance of meat after death. The slightest exertion to an animal under such circumstances, might suddenly prove fatal. Were a man, in this condition, to present himself at an assurance office, it would refuse to insure his life at any premium. Yet, under similar circumstances, a sheep is awarded gold and silver medals, and its feeder a prize of £20."

Cholera. Dr. Pinkerton* thinks the following propositions in relation to the communication of cholera, may be laid down as proved:

1. Cholera spreads *to any considerable distance*—beyond five hundred yards—by personal communication, not by the atmosphere. 2. When once the "cholera poison" is carried to a spot favourable for its development, it will there attach itself, lying dormant for a period of time, not yet fixed by any observation—certainly not less than four months, and is always likely to break out among strangers living over the spot, in a house, hut, or ship. 3. Men so living, fall ill during a time of fatigue, watchfulness, and irregularity of living, as in trench duty, or during an epidemic of diarrhœa.

Drinking Waters of London. Dr. Lankester in an excellent article on the *Drinking Waters of the Metropolis*, observes, that

"The water used in London for drinking purposes is obtained from both rivers and springs. The Thames and the New River, and partially other rivers, supply the river water. The spring water is of two kinds. First, from surface wells, obtained by digging through the gravel which covers the London clay in the western parts of the metropolis, and into the clay itself. Secondly, from deep wells, which generally pass through the London clay, and penetrate the chalk below. The surface wells receive the soakage of the water which falls over London, and the water is contaminated by the contents of cesspools, drains, and sewers. The deep wells receive their supply of water from the chalk

* The Spread of Cholera by Personal Communication, as seen in the Crimean Campaign. By A. W. P. Pinkerton, M.D.

which forms the sides of the great 'London Basin.' All these waters contain more or less of the following mineral constituents: —1st, carbonate of lime; 2nd, sulphate of lime; 3rd, chloride of sodium; 4th, phosphates and silica; 5th, ammonia; 6th, nitrates and organic matters."

Dr. Lankester concludes that the waters from deep wells as most desirable and unobjectionable as drinking water; that the water from surface wells ought, under no circumstances, to be drunk at all; and that if Thames water is used, it ought to be filtered, or, what is better, boiled and filtered.

Mortality of the Army.

Dr. Guy,* in the eloquent lecture in hand, gives some very clear and forcible expositions of his subject. We had the pleasure of hearing the lecture, and have still further pleasure now in recommending it in its printed form to our readers. One fact which we herewith quote is of great interest. It refers to the mortality of the Fire Brigade. The deaths of the London Fire Brigade corps, between the ages of forty and sixty years, number seventy per ten thousand per annum. The deaths of the Infantry of the line number by the same scale, one hundred and eighty-seven per annum; of the Foot Guards, two hundred and four; of the Household Cavalry, one hundred and ten; and of the Dragoon Guards and Dragoons, one hundred and thirty-three. Having stated these calculations, Dr. Guy proceeds thus to speak of the Fire Brigade:

"Now, this is the class of men of whom I said just now that I would give you some account. I am indebted for the particulars of their occupation and consequent mortality to Mr. Charles Frederick Browne, the surgeon to the force; and I am happy to see a gentleman here this afternoon (Mr. Braidwood, the superintendent), who can confirm the statements I am about to make.

"The ages of the firemen range from twenty to sixty and upwards; and there is one man now in the service in his seventieth year, quite able to take his turn of duty with the rest. The men are carefully selected, full three-fourths of them having been men-of-war's men. The duties they have to perform are by no means light; for each man, on the average, has been on duty at the stations, or on the watch on premises damaged by fire, three days and three nights, of twelve hours each, in every week of the past year. This is exclusive of attendance to clean the engines and tools, and keep the hose in order, and of a sort of engine-drill for the younger men twice a-week. The men have also to attend and work at fires, where they are in the midst of intense heat, steam,

* The Mortality of the British Army. By W. A. Guy, M.B. London: Renshaw. 1858.

and smoke, saturated with water, and obliged to stand in elevated situations exposed to severe and cutting winds, so that the men are often seen in winter literally encrusted with ice. They are sometimes called out by fires, or alarms of fires, as many as four times in a night. But, notwithstanding this hard duty and extreme of exposure, the rate of mortality among the men is highly favourable. For the first thirteen years of the establishment, the deaths were at the rate of 96 per 10,000; while for the last twelve years they had fallen to 70 per 10,000. But these calculations include deaths by accident, which, in spite of the perilous nature of the employment, have not exceeded 44 in 10,000 in the whole period of twenty-five years. The higher mortality of the early period is attributed, and probably with justice, to less careful selection; but the moderate rate prevailing throughout the whole period of twenty-five years is evidently to be attributed to the unusual care and attention bestowed on the comforts and health of the men, who live either at the stations or in houses provided by the establishment, and subject to careful inspection. The management is in the hands of a committee, appointed by the several Fire Insurance Offices, who pay the men liberally, give them plenty of warm and comfortable clothing, instruct the medical officer and superintendent to look narrowly to the healthy state of the stations, and the other residences of the men, and act with promptitude and liberality on any suggestions which these efficient officers may please to make. This, I believe, is a fair and accurate account of this very healthy class of men.

"Here, then, we have a case of night work and exposure to weather certainly far exceeding in severity the night duty which the foot soldier has to perform; for I understand that the soldier is on guard only every fourth or fifth night. Yet this night-work, and this exposure to weather, being accompanied, in the case of the fire brigade, by the most scrupulous care of the health and comforts of the men, is compatible with the favourable rate of mortality shown in the table. May not the unfavourable death-rate of 204 in 10,000, prevailing among the Foot Guards, be partly accounted for by the substitution of carelessness for care?"

Causes of Idiotcy.

We have rarely met with a report which has afforded us more of instruction than the Report on the Causes on Idiotcy, by Dr. Howe. The question raised is one which we must review at length at a future day. Meantime, there is a passage which, as it contains the pith of the argument as to the causes of idiotcy, deserves special note.

"The health and vigour of the body may be compared to a man's capital; it is a trust fund given to him by the Creator, of which he may expend the interest in the natural enjoyments of

* Report on the Causes of Idiotcy. By S. G. Howe, M.D. Edinburgh: Maclachlan and Stewart.

life, but he cannot encroach in the least on the principal without real loss. Every debauch, every excess, every undue indulgence is at the expense of this capital. A rich man may throw away cents or dollars and not feel it, but he is really poorer for it; and a young man, with a large capital of health, may daily throw away part of it, and still feel strong; but every over-stimulant to the nerves, every over-load to the stomach, is a cent or a dollar taken from his capital; feel it, or not feel it, he is poorer for it, and so will be the children afterwards born to him."

Hygiene.

We must not omit to notice a work of the past quarter on hygiene, by Dr. James H. Pickford.* It is an English systematic treatise on the subject. The book shows immense industry and great knowledge on the part of its author, and to sanitarians who require (and what sanitarian does not require it) a work of reference on sanitary science, this book is invaluable. To ourselves, as public teachers on Hygiene, we have felt practically the value of Dr. Pickford's labours, and have already availed ourselves of them for lecture-room purposes. For these reasons we recognize this book as of great worth, and recommend it as it deserves. But the construction of the book is, as we fear, opposed to that general success and usefulness which its author desires for it. It is full of facts, and is accurate in its details; but it is a book for the close student only. Unrelieved by the slightest touch of that artistic skill in literature which makes the new and difficult scientific lesson pleasurable, nay, bearable, it fails utterly as a genial instructor, and falls we fear from the press still-born. We hope Dr. Pickford will some day re-model his work. He has laid a foundation; let him now build an edifice. We describe his present work best by saying, that next to Oesterlen's "*Handbuch*", it is the most complete epitome of sanitary science extant.

We must this time be content to refer merely to Dr. M'William's able Report of the Commissioners of Her Majesty's Customs, and to his Statistical account of the health of the Water-guard and Water-side Officers; to the report of Dr. Edwin Snow (a distinguished American sanitarian) on the "Births, Deaths and Marriages of the City of Providence in 1857," and on "The History of Asiatic Cholera in Providence"; and to several admirable papers in the *Philanthropist* of the present year on "Prison Discipline and Diet," by Dr. Edward Smith.

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* Hygiene. By James H. Pickford, M.D. London: Churchill. 1858.

## THE THAMES.

THERE has been no small excitement in London during the late hot weather, in regard to the state of the Thames. The Houses of Parliament have become infested with strange smells. Justice, in its court, has hesitated whether to proceed, lest the Oxford Black Assize be reperpetrated; and royalty on the river has found a bouquet something more than a luxury. There have been strange stories flying of men struck down with the stench, and of all kinds of fatal diseases upspringing on the river's banks. There has been much exaggeration as to the amount of mischief done to the health of the community by the foul river, and much absurd speculation as to the necessary consequences to be expected from it. Plague is predicted, yellow fever, and cholera. The two latter might come if they were brought; and if they did come by their poisons being conveyed, their spread would be unquestionably favoured by the present impure state of things. These diseases, however, need not be expected from a river, however dirty, if it be not charged with their poisons. The true risk of an epidemic from the river in its present condition lies mainly in a risk of fever in persons living on or near the river, and who, heedless of all law of cleanliness, take their water supply from this filthy source. At the same time, there can be no doubt that a contagious epidemic of any kind breaking out now in the neighbourhood of the Thames would prove irresistibly fatal, since the gaseous emanations from a great sewer eat up the disinfecting ozone, and inhaled by animal bodies derange the organic chemistry, and favour the development of disease. Without any unnecessary exaggeration of the evil, it is necessary therefore that the Thames should be cleansed, and that such arrangements should be made as shall at once lead to the constant and ready removal of the sewage with which the water is loaded. Of the thousand schemes for Thames purification, all are alike inapplicable in an emergency, and, as we still believe, inapplicable altogether; the plan suggested by the late Royal Commission being no exception to this rule. Amongst the temporary plans for relieving the river of its dirty burthen, the one most likely to answer the purpose for the present, and it may be for the future, consists in adopting for the direct removal of sewage a system resembling the present water conveyance system. A series of pipes laid down in the riverside to receive the sewage flow, and convey it onwards towards the sea,

from the city, would at once meet the emergency. A series of small sewer streams would thus be laid down in the midst of the purer river current, but separated from it; and this system of iron sewerage might be afterwards extended, removed, or modified, as required. The iron canals could be flushed from the river itself, by an extension of them upwards to a distance beyond the first main source of contamination, and by conveying the contents of the sewers into them by side intercepting branches. The plan here proposed is not new. It is embraced in a scheme laid down by Mr. Austin. It is described on a grand scale in our last number, in the plan suggested by Dr. Huxley. The modification, indeed, in the present suggestion, consists only in substituting a series of small canals for one or two of massive proportions; but its advantages are obvious; it admits of being carried out at a comparatively trifling cost, with great rapidity, and as a grand experiment which may be given up, should it fail, and no one feel the worse for the adventure.

There is yet another idea which has occurred to us, and which, at least, deserves as much consideration as the majority of the schemes which have been brought before the public. This idea suggests that floating reservoirs might be constructed for the reception of the sewer flow. We see no reason why the contents of a sewer might not be intercepted by a floating reservoir, through which the water part of the sewage might filter, and which, when charged with the solid and valuable sewage matter, might be tugged away for its contents to be disembarked elsewhere, and disposed of for agricultural purposes. We doubt not that with this arrangement rendered practicable, all the cost of sewage removal would be undertaken by, and could be safely entrusted to private enterprize. The lading of sewage vessels, with valuable cargoes indeed, introduces merely a new business for the river sailor.

## VENTILATION OF ST. JAMES'S HALL, PICCADILLY.

We confine our notice of this building chiefly to the ventilation of the great hall. The body of the room is 94 feet long and 60 feet wide; and its height to the crown of the ceiling, which is semi-cylindriform, is 59 feet 3 inches. At one end, in addition, is the orchestra recess, 43 feet 6 inches in diameter, enclosed by a semi-circular wall; and at the opposite end another recess containing two galleries. The extreme length is 139 feet. The room is arranged to seat conveniently an audience of 1700 and an orchestra of 400 persons. It has a capacity of 338 thousand cubic feet, which is equal to 161 cubic feet of air to each person.

The ventilation is effected by perforated panels in the ceiling. In the large ceiling above the body of the room are thirty-two such panels, arranged in four rows of eight panels each, lengthwise of the hall. Above these perforations zinc tubes are carried up to above the slated roof, and covered with zinc tops. It is these tubes and caps which give the singular appearance to the building, as seen from Regent Street and Piccadilly. In the crown of the ceiling of the gallery recess is one more perforated panel.

In consequence of the curved form of the ceiling, the two side rows of perforated panels are at a level of 6 feet 3 inches lower than the central rows, and on a level with that in the ceiling of the gallery recess. The effect of this arrangement of apertures is that the cold air of the atmosphere descends through the perforations at the lower level, and the heated air ascends through those at the upper level. The fresh air is warmed and diffused in its descent, while its velocity is expended. To give full effect to this action, ingress of air at the doors is prevented as far as possible. When it is desirable, as during hot weather, to maintain a temperature inside as even as possible with the outside air, the doors are kept open, whereby all the apertures in the ceilings become outlets of air. By this arrangement, the room has been very nearly as cool as the outside.

The hall is lighted by sixty-eight gaseliers, diffused at equal spaces over the body of the room, and suspended 21 feet below the ceiling; each gaselier has eight burners radiating horizontally. The only provision especially for warming is two open fireplaces in the side walls.

# ORIGINAL COMMUNICATIONS.

## NOTES ON THE TOPOGRAPHY, METEOROLOGY, AND SANITARY CONDITION OF SINOPE;

### WITH REMARKS ON THE DOMESTIC HYGIENE OF TURKEY.

By J. N. RADCLIFFE, M.R.C.S.Eng., late of the Staff of H.H. Omar Pacha.

### I. TOPOGRAPHY.

ANCIENT Sinope was best known as a stronghold and the head of an independent state; modern Sinope is best known from its position on the finest bay and safest haven on the southern coast of the Black Sea. Indeed, the Bay of Sinope is styled "*the heaven of the Black Sea*" by the Turkish and Greek sailors who frequent it; for it affords a readily accessible and safe anchorage during the heavy gales which are apt to prevail upon the coast in the winter months.

A range of precipitous mountains, wooded here and there from base to summit, and sweeping in one vast amphitheatre from south-east to west, shuts in the bay on the south and west; and a series of rolling and richly wooded hills run from the shores of the bay to the base of the mountains. On these hills, in the intervals of the dense woods, are lovely grassy slopes and red-tiled hamlets; and where, as at the bottom of the bay, the green slopes are traversed with slight fences, and the wood walls of the houses are hid amid the foliage, the scenery has a very English-like aspect. In the south, the mountains seem to approach nigh to the shore of the bay; but in the west they recede several miles inland, and their rugged summits may be seen peering, tier above tier, high in the clouds. Jutting out from the continent, and connected to it by a narrow and but slightly elevated neck of land, a bold and rocky peninsula projects into the ocean in the north-west, and, running in a direction from north-west to south-east, it shuts in the bay to the northward. Towards the ocean, this peninsula presents a series of steep and rugged cliffs, which are bare and lifeless in the winter, but in the summer they are fringed at all points with wild flowers and rich verdure. Beyond the eastern point of the peninsula, a solitary grey rock just lifts its head above the water. Towards the bay, the peninsula sweeps down to the water's edge in green slopes, which are intersected with slight ravines, down which run scanty streams; and in the easternmost ravine, at the base of the mountainous extremity of the peninsula, is ensconced a little hamlet. The sides of this ravine are covered with wood.

The town of Sinope occupies the neck of the peninsula, extending quite across it, the northern fortifications being washed by the waves of the open sea, the southern by the waters of the bay. Outside the walls, on the southern face of the peninsula, there is a large suburb, inhabited principally by Greeks.

The anchorage is opposite the town; and from the anchorage the view of the town and the peninsula is very lovely, particularly when the trees are in full foliage. The grand old walls, with their numerous towers, and the time-worn citadel, form a heavy framework, above which peer the red-tiled broad-eaved roofs and red walls of the dwelling-houses, and the white walls, blue domes, and tall minaret, of the principal mosque, the dark verdure of the bay and the myrtle tree, and the luxuriant foliage of the fig-tree. On the right, beyond the walls, the thickly scattered houses of the suburb come down to the shore; and the deep red tiles of the roofs, and the many colours of the walls, form a brilliant contrast, as they are seen among the rich foliage which grows freely in the intervals of the different buildings. Some of the houses are painted a deep red; others are of a lead colour, relieved with white; many glow with the bright yellow of the fresh unpainted wood; and many more, which have long stood the brunt of wind and weather, present the most varied hues, brown, black, and grey. This great variety of colours, mingled with the deep green of the foliage, and seen under a pure sky and a bright sun, has a singularly beautiful effect.

The peninsula, according to a rough estimate, is upwards of three miles in length, and about a mile, or somewhat more, in breadth at its broadest part. It is a huge offshoot of mountain limestone; but here and there, at the base of the north-western extremity, a ferruginous conglomerate crops out, recalling the period when Sinope was a port from which the ancient Greeks obtained a highly prized species of iron. A broad strip of marshy ground, the greater portion of which, if not the whole, is dried up during the hotter seasons of the year, runs along the whole length of the table-land on the summit. On the edges of the marshy ground, and on those portions of the table-land which are not swampy, or which are earliest dried up, as well as on the slopes of the peninsula, large crops of wheat are grown yearly; but the produce is not so great as it would be if the ground were better tilled, and the table-land on the summit carefully drained. It is related that, among other advantages of ancient Sinope as a fortified place, it was in a great measure independent of supplies from the continent during a siege, in consequence of the fruitfulness of the penin-

sula. This is probably no exaggeration; for, with little care, the greater portion of the surface of the peninsula might doubtless be made so productive, as to yield sufficient for the ordinary requirements of an oriental garrison and town for some time.

There are many springs of excellent water on the peninsula, and almost the whole of these springs, as is customary in the East, are carefully built in, and the water is conducted into a stone basin, while in a recess near the conduit is placed a wooden or metal drinking vessel, for the use of the wayfarer. Several of the springs give a supply of water only during the moister seasons of the year; others pour out a constant and copious stream; and from the two principal springs (one on the southern slope of the peninsula, and the other high up on the face of the north-western extremity) the town is chiefly supplied with water. Stone conduits conduct the water along the surface of the ground to the town, and distribute it to the different fountains. In consequence of imperfections in the conduits, or of the springs being insufficiently protected, the water is apt to become muddy during rainy weather, and even after a heavy shower.

The isthmus is a narrow low ridge, which slopes gently on the north and south to the water's edge. The north side of the isthmus is formed of calcareous limestone rock, which runs out some distance to sea, barely beneath the surface of the water; the south side and summit are formed of sedimentary deposit washed down from the slopes of the peninsula, or deposited by the waters of the bay. There are no remains of the harbour which, it is recorded, existed on the north side of ancient Sinope. At the present time, boats of light draught only can anchor securely in a little cove at the north-east angle of the town. A mass of limestone rock juts up near the point of junction of the isthmus with the continent, and this rock is crested by a portion of the ruins of the citadel. Several wells are sunk on the southern slope of the isthmus, within the walls of the citadel; but the water is rarely or never used except for cleansing purposes, being brackish, or otherwise offensive.

Sinope is clustered beneath its old walls. When the armed peasant from the continent visits the town, he must give up his weapons at the gates before he enters. Beyond the sand-hills which cover the isthmus beneath the walls of the citadel, outside the gates, and beyond the white tombstones of the cemetery, which is almost swallowed up in the heaped up sand, but a few paces altogether, and one is, to all intents and purposes, in the country. The roads at once become narrow

and uneven tracks, deep in mud, and generally impassable in rainy seasons, and rough and rugged in dry seasons.

Outside the walls, the country is most lovely. Rolling hills, richly wooded, run along towards the mountains, and in the intervals of the wood are patches of cultivated ground; while on every hill and in every valley there stand solitary houses, or a cluster of two or three, dignified with the name of a village, and a position, perhaps, on the map. The woods are thick, full of undergrowth, and wild and stunted, near the seashore; but, as the mountains are neared, dense groves of splendid trees are found, and at every step one plunges further into those forests which from time immemorial have rendered Sinope important as a port for the exportation of timber, or for shipbuilding.

In the valleys and along the seashore (particularly towards the west, in the direction of Aklimane), there are large marshes and swampy tracts of ground, the necessary accompaniments of an imperfectly cultivated but rich and well watered country; and not unfrequently, in the pallid and wasted features of the peasantry living nigh the marshes, may be traced the evil effects of a malarious atmosphere. When the wind sets in from the north-west, the malaria from the marshes on the west is blown over the hills contiguous to the town; and intermittent fever not unfrequently occurs, as a consequence, in a clump of houses which is beautifully situated on a knoll just beyond the sandhills, and overlooking the bay.

The country abounds with game. Between November and April, wild boar may be found in the woods; wild ducks and swans in the marshy grounds; bustards, large and small, upon the bare hills; snipe, quail, and other game, in the valleys and on the hill sides; and the streams and the bay teem with fish.

## II. METEOROLOGY.*

I was stationed at Sinope from the commencement of November 1855 until May 1856, and, during the principal portion of that period, I noted such meteorological changes as the very imperfect means at my command enabled me to do. The only meteorological instruments which I possessed were two Fahrenheit's thermometers (one being a very excellent one by Newman), and a marine barometer, the action of which has proved to be very creditable, on being very kindly compared by Messrs. Negretti and Zambra with their standard baro-

* Abstract of a paper read before the British Meteorological Society, March 24th, 1857.

meter, since my return to England. I registered the indications of these instruments at stated intervals daily, as well as the direction and approximative force of the wind, the amount of cloud, and general characteristics of the weather; and, although my observations apply solely to the greater fluctuations of the atmosphere and of temperature, to the ordinary changes of the weather, and to the conduct of the barometer during storms and winds, yet they may possess some interest, in the absence of any other observations from Sinope, and in so far as they refer to the almost proverbial storms of the vexed Euxine.

The house in which I was quartered, and in which the observations were made, was situated about forty feet above the level of the sea, near the centre of the Greek suburbs; and it was well sheltered from the winds. The thermometers were, from necessity, suspended about twenty feet above the level of the ground, and they were attached to the wood walls of the house exteriorly. The instruments were sheltered from the direct rays of the sun, and from the rain; but their position would necessarily expose them to radiation from the walls of the building: hence their indications would doubtless be in excess of what would have been noted under more favourable circumstances. The barometer was suspended in the apartment I commonly used, at an elevation also of about twenty feet above the level of the ground; but the necessary corrections for temperature, and also for capillarity and index error, have been made, and the observations reduced to their legitimate quantity. The bold headland formed by the western extremity of the peninsula was apt to deflect the winds from certain quarters, particularly from the eastward, and thus lead to an erroneous opinion of the direction in which the wind blew by an observer in the town; but I endeavoured to correct any errors which might arise from this source by comparing my observations with the logs of ships anchored in the bay.

1. The winter of 1855-56 was regarded by the inhabitants of Sinope as milder than usual: there was less cold, less snow, and less frost. But such a season as was then experienced was no uncommon event; and it was said that Sinope at all times escaped from the severe winters which prevail along the coast eastward of the bay.

Sheltered by the peninsula from the north-east winds, perhaps the coldest winds which blow in the south-eastern division of the Black Sea; shut in, in great measure, from southerly winds, by a range of mountains; and resting upon a narrow isthmus between two broad expanses of water,—

Sinope is rarely situated for obtaining a very equable temperature. It might be predicated, that its summers would be cooler and its winters warmer than those of contiguous towns on the coast; and the experience of the inhabitants would seem to show that such is the case.

On no day during the winter of 1855-56 did the thermometer indicate a freezing temperature throughout the hours of observation. The lowest temperatures observed between morning and night occurred on the 5th of March, when, at 9 A.M., 4 P.M., and 10 P.M. respectively, the thermometer stood at 33°, 33.3°, and 30.5° Fahr. February and March were the two severest months of the winter; and it is stated that the brunt of the cold season generally falls upon these months. With April comes fine weather; and in May spring is fully developed with the heat and almost with the verdure of summer. The latitude of Sinope is 42° 2′ 2″ North; the longitude, 35° 12′ 5″ East.

2. The following is a summary of the barometrical and thermometrical means, the prevalent winds, and the weather, during December 1855, and January, February, March, and April, 1856.

December 1855. Barometer—*mean* of sixty observations at 9 A.M. and 4 P.M., 29·443; *minimum*, observed December 14th, 29·43; *maximum*, observed December 20th, 30·40; observed range, ·97. Thermometer—*mean* of sixty observations in the shade at 9 A.M. and 4 P.M., 49° Fahr.; *minimum*, observed December 30th, 38°; *maximum*, observed December 7th, 66°; observed range, 28°. Cloud—*mean* amount of, 6·05 (0—10). Winds—N.W., 10; N.E., 4; S.E., 5; E.S.E., 1; S.S.E., 1; S., 1; S.S.W., 1; S.W., 2; variable, 1. Rain fell on thirteen days, principally in showers, more or less heavy. There was only one day in which the rain continued from morning until night. Snow fell in showers on four days; and hail fell on one day. On the night of the 17th, there were several flashes of lightning, and a few peals of thunder, the wind being squally at the time.

On the morning of the 15th of December, the summits of the mountains south of Sinope were covered with snow, and it had not entirely disappeared, still remaining on the loftier peaks and ridges, when my observations ceased on April 30th.

January 1856. Barometer—*mean* of thirty-seven observations at 9 A.M. and 4 P.M., 29·999; *minimum*, observed January 31st, 29·65; *maximum*, observed January 15th, 30·39; observed range, ·64. Thermometer—*mean* of thirty-seven observations in the shade at 9 A.M. and 4 P.M., 49°; *minimum*,

observed January 15th, 33°; *maximum*, observed January 31st, 74°; observed range, 41°. Cloud—*mean* amount of, 5. Winds—N.E., 6; S.W., 4; variable, 10. Rain fell in showers on five days. Snow fell on two days, once lying two days. There was an interruption to the barometrical and thermometrical observations from the 20th to the 30th inclusive.

February 1856. Barometer—*mean* of seventy-seven observations at 9 A.M., 4 P.M., and 10 P.M., 29·934; *minimum*, observed February 1st, 29·50; *maximum*, observed February 5th, 30·38; observed range, ·88. Thermometer—*mean* of seventy-seven observations in the shade, at 9 A.M., 4 P.M., and 10 P.M., 46°; *minimum*, observed February 19th, 33°; *maximum*, observed February 12th, 64·5°; observed range, 31·5°. Cloud—mean amount of, 5·9. Winds—N.W., 8; N.E., 3; E., 1; S.E., 4; S.W., 1; variable, 13. Rain fell in showers on nine days; snow fell in showers on six days; and hail fell on one day. The first film of ice which I observed on the pools near my quarters was on the morning of the 20th.

March 1856. Barometer—*mean* of seventy observations at 9 A.M., 4 P.M., and 10 P.M., 30·038; *minimum*, observed March 30th, 29·56; *maximum*, observed March 15th, 30·40; observed range, ·84. Thermometer—*mean* of seventy observations in the shade, at 9 A.M., 4 P.M., and 10 P.M., 41·3°; *minimum*, observed March 5th, 30·5°; *maximum*, observed March 13th, 55°; observed range, 24·5°. Cloud—mean amount of, 6·9. Winds—N.W., 7; N.N.W., 2; N., 3; N.E., 1; E., 1; E.S.E., 1; S.E., 5; S., 7; variable, 12. Rain fell in showers on five days; snow fell in showers on seven days, and almost continuously on two days. During the night of the 7th, and early in the morning of the 8th, five inches of snow fell; on the 10th, a thaw commenced; and on the 11th, the snow disappeared. Sleet fell on two days, and hail fell on one day.

April 1856. Barometer—*mean* of seventy-four observations at 9 A.M., 4 P.M., and 10 P.M., 29·981; *minimum*, observed April 28th, 29·66; *maximum*, observed April 2nd, 30·21; observed range, ·55. Thermometer—*mean* of seventy-four observations in the shade, at 9 A.M., 4 P.M., and 10 P.M., 51°; *minimum*, observed April 3rd, 37°; *maximum*, observed April 17th, 60°; observed range, 23°. Cloud—mean amount of, 5·5. Winds—N.W., 13; N.E., 2; S., 9·3; S.E., 10; variable, 1. Rain fell in showers on eight days, and on one day it continued throughout the day. Snow fell on the night of the 2nd to the depth of four inches, and on the 3rd and 4th slight showers fell, but on the 5th the snow had disappeared. Hail fell on two days; and on the afternoon of the 11th there oc-

curred lightning, with a few peals of thunder and a variable wind.

3. There was a marked general correspondence between the rise and fall of the barometer and the variations of temperature, the mercury rising as the temperature fell, and falling as it rose.

During 59 northerly winds, the barometer rose in 45, sank in 10, and was stationary in 4. During 31 southerly winds, the barometer sank in 26, and rose in 5. During 3 east winds, the barometer sank in 1, and rose in 2; and during 37 variable winds, the barometer sank in 22, and rose in 15.

The northerly winds being the *cold*, and the southerly winds the *warm* winds, and the atmosphere being heavier during the prevalence of the former than of the latter, it follows that the conduct of the barometer in regard to these winds will be similar to that observed with regard to variations of temperature. The main exceptions to the rise or fall of the barometer during the prevalence of northerly or southerly winds coincided with the formation or passage of storms.

4. Eight gales passed over Sinope during the period of observation. Of these gales, seven were preceded by a fall of the barometer, and one by a stationary barometer, during twenty-four hours. Five of the gales occurred during the night; one in the evening; one in the afternoon and evening; and one during the night and following morning. The duration of none of the gales exceeded thirteen hours. Two of the gales were from the north-east, four from the north-west, and two from the south-east; and two occurred in November, one in January, four in February, and one in March.

The conduct of the barometer and the veering of the wind preceding and following the gales would seem to indicate that they were revolving storms; and the brief duration of the storms, and their rapidity of access, lead to the supposition that they were storms of comparatively contracted area, and that they depended in the main upon atmospheric changes occurring upon the coast.*

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* Towards the termination of December 1855, as the *Rajah Rajah Swarree*, a teak built vessel of 600 tons, was approaching the Straits of Kertch, with most of her sails set, a squall suddenly swept up from the eastern coast (coming from the "bed of Boreas", as the ancient Greeks termed the Caucasian mountains), and carried away the whole of the three masts, leaving the vessel a complete wreck. Ships under easy sail were visible from the wreck, a few miles both a-head and a-stern; but they were not affected by the squall. The *Rajah Rajah Swarree* drifted directly south until she reached the Anatolian coast, a little to the east of Samsoun, when her anchors were dropped, and she was picked up by a coasting steamer and brought into Sinope.

The principal circumstances attending each gale are set forth in the accompanying table. (p. 154.)

5. Squally weather occurred six times with a rising barometer, four times with a falling barometer, and once at the apex of a rise. The weather became squally once in November, five times in December, once in January, once in March, and thrice in April. With a rising barometer, the squalls came up from the N.W thrice, from the N.E. twice, and from the S.E. once; with a falling barometer, from the S.S.W. once, from the N.W. twice, and from the N.E. and N. once; and at the apex of a rise, from the N.E. once.

6. There were seventeen depressions of the barometer which were more or less worthy of remark, from their extent and rapidity. Of these depressions, seven, as already noted, were followed by gales; and of the remainder, the majority occurred coincidently with an elevation (in several instances sudden) of temperature and a variable wind.

7. The barometrical curve described four greater and two smaller waves. The duration of these waves, and their order of occurrence, were as follows: a small wave commencing on December 6th, and terminating on the 12th; a large wave commencing on December 15th, and terminating on January 31st (this wave was interrupted by a considerable inflection, commencing on the 6th, and terminating on the 16th of January); a second large wave commencing on February 1st, and terminating on the 23rd; a second small wave commencing on February 23rd, and terminating on March 4th; a third large wave commencing on March 4th, and terminating on the 30th; and a fourth large wave commencing on March 30th, and which had not terminated on April 30th.

8. The climate of Sinope appears to offer great advantages to the settler or invalid who may be led to the southern shores of the Black Sea, due care being always exercised to avoid the sources of atmospheric pollution which abound within the town, and the marshy districts which are plentifully scattered outside the walls.

### III. SANITARY CONDITION.

Although Sinope has a very picturesque aspect as seen from without, it is not so picturesque within. Not that the interior is altogether devoid of beauty; for there are fragments of old fortifications; gaudily decked, yet time-worn houses; quaint fountains, traversed with ancient inscriptions, and overhung with foliage; and narrow rough streets, which would be treasures to an artist, and which would prove gems on canvas,

| No. | Direction of gale. | Date. | Period of day when it occurred. | Duration. | Barometer. Amount of depression. | | | | Time occupied by depression. | | | Wind. | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Before gale. | During gale. | After gale. | Total amount. | Before gale. | During gale. | After gale. | Before. | After. |
| | | | | hours. | | | | | hours. | hours. | hours. | | |
| 1 | NE. | 27 Nov. | Evening. | 2½ | ·35 | ·05 | ·11 | ·51 * | 11 | 2½ | 10½ | 0 | 0 |
| 2 | NW. | 30 Nov. | Night. | 5? | ·17 | ·21 | ·0 | ·38 | 30 | 5? | 3 | NE. 4* | 0 |
| 3 | NE. | 13 Jan. | Night. | 7 | ·0 | ·0 | ·0 | ·0 | .. | .. | .. | SW. 6 | NE. 5 |
| 4 | NW. | 9 Feb. | Afternoon and evening. | 12 | ·33 | ·0 | ·0 | ·33 | 55 | .. | .. | E. and NNE. 1 | 0 and SE. 1 |
| 5 | NW. | 12 Feb. | Night and morning. | 12 | ·36 | ·0 | ·0 | ·36 | 35 | .. | .. | SE. 1 | NW. 1-5, and 0 |
| 6 | SE. | 20 Feb. | Evening and night. | 12 | ·14 | ·13 | ·0 | ·27 | 18 | 6 | .. | NE. 2 | E. to NE. and SE. 1 |
| 7 | SE. | 22 Feb. | Night. | 8 | ·33 | ·13 | ·0 | ·46 | 24 | 8 | .. | E. to NE. and SE. 1 | E. to NE. 1 |
| 8 | NW. | 4 Mar. | Night. | 13 | ·22 | ·0 | ·0 | ·22 | 31 | .. | .. | SSW. W. to N. 1 | SW. and S. 3 |

* Force, 0—10.

where mud forms a capital foreground, and tumble-down buildings look picturesque in their ruin, but not wretched; and foul odours are altogether wanting.

The houses are all built upon the same plan. This is, a basement story formed of a strong framework of wood, the interspaces being built up with stone, generally undressed; and over the basement is erected a story built of wood, either in good three-fourths-of-an-inch plank, as in the better class of houses, or of broad laths, as in the inferior class. Some of the best houses are built throughout of brick or stone, in the interspaces of the wood framework. Most of the houses are painted externally; all have broad eaves; and in nearly all the second story projects beyond the basement, and overhangs the street, approximating tolerably closely to the jutting portions of the houses on the opposite side. In some houses, that part of the second story which projects above the street is converted into a species of balcony. The windows of the better houses are glazed, and, in the houses of Mussulmen, latticed; but, in the commoner houses, the windows are unglazed, and simply closed by shutters.

The projection of the upper stories of the houses above the street is an important adjunct to the picturesque aspect of the town, but it has one great drawback. It is very customary both with Turks and Greeks to cast anything which may have to be rejected through the window into the street. Occasionally, also, the spouts leading from the sinks of the houses project high above the head, towards the centre of the roadway. Moreover, the floors of many of the projecting stories are formed of planks fixed so widely apart that it is simply necessary to cast water upon them to get easily rid of it; and when they are cleansed, a shower of a most unpleasant description usually falls into the street. Hence it happens that a sharp look-out is required in passing along the streets, in order to avoid being deluged with filthy fluids cast from above.

Many of the houses, particularly those newly built and painted, have an exceedingly neat and clean appearance, and their construction is not without taste. The eaves are ornamented with mouldings; the supporting frames and window frames are slightly decorated; and the whole of these ornamented portions are painted white. In the higher class of houses, the under portions of the eaves are decorated in a somewhat pretentious fashion; and, in some of the older houses, it is not uncommon to see beneath the eaves an elaborately designed and very elegant depending cornice, which at one time had been gaily painted in divers colours. But it is

difficult to conceive the wretched, ruinous aspect of the older houses which are denuded of paint, and of which the wood is mossy-grey or black with age, and is traversed with broad gaps and rents. This is indeed the condition of the majority of Turkish houses; and it is the predominance of such dwellings which is the chief characteristic of a Turkish town, and which gives to it its peculiar tumble-down and miserable aspect when viewed close at hand.

There is a singularity about the houses of all classes in Sinope, in the addition of small windows, variously, and often elegantly designed, and filled with glass, which is not unfrequently fancifully coloured. These windows are fixed above the ordinary windows of the house, and it is not uncommon to see several in one apartment.

The roofs of the houses, which are invariably tiled, have also stuck upon them, commonly in the most conspicuous part, an ornamented and variously designed appendix.

The streets are narrow, paved irregularly with boulders and stones, interrupted plentifully with deep holes, and in the centre runs the main sewer, towards which small rills of fœtid, offensive matter flow sluggishly from the houses on each side.

The houses are entered, generally, by large folding doors, which open into the basement story. This story is used indifferently as a stable, a cow-house, or a store-house, and not unfrequently within it, or communicating with it, or at the most placed just without, nigh to a door leading from it, is an enormous cesspool, connected with the privy. A few planks, or a stone slab or two, having an aperture of communication, being placed above the cesspool; or a connexion being made with it by means of earthen tubes, conducted to the upper floors of a building, as in first-class houses, forms all the fitting up of a Turkish privy. Ascending from the basement story by a flight of wood steps the second story is reached, which is occupied by the family. In comparatively new houses, where the wood is not discoloured by time, the appearance of this story is invariably most pleasing. The walls are usually arranged in neat, oblong panels, the rooms have a plentiful supply of cupboards and other receptacles about them, and frequently a narrow platform, or divan, partially surrounds the apartments, or is placed in a recess, beneath a wood canopy, more or less ornamented. The ceiling is also of wood, panelled like the walls of the room. The bright yellow of new wood gives a very agreeable aspect to apartments thus constructed. In the higher class houses the walls are painted, and there are more vigorous attempts at decoration; festoons of singularly

designed flowers being painted along the upper portions of the walls, the panels having centre pieces representing miracles of floriculture, in which roses, pinks, and tulips grow from one stem, the leaves of which are in themselves, as should be the case, exceedingly peculiar. The rooms invariably abound in windows.

In the older houses and those of the poverty-stricken, when the wood-work is time-worn and fissured, and the floor slight and badly made, the structures are little better than huge sieves, which the wind and the rain permeate freely; and the wood being blackened by time, smoke and filth, the interiors have a most wretched aspect.

Every house possesses a plot of ground in the rear. Some of these plots may perchance be cultivated in a certain fashion, but in general they are filled with rank grass, weeds, and trees, the fig, with its luxuriant foliage and wide-spreading branches, being predominant. The abundance of foliage, and its contiguity to the houses, adds greatly to the picturesque aspect of a Turkish town, and relieves somewhat the wretched flimsiness which else would be so apparent in a series of wood houses crowded together.

Doubtless, as I can testify from personal experience, a wood house is, when newly built, a very satisfactory and pleasing residence, but, sooner or later, the watchful eye will detect sundry minute spots in the neighbourhood of the crevices of the wood in the different rooms, and then one may bid farewell to all persistent comfort, unless he have, by good hap, obtuse feelings, or be a native; for at nightfall there will be seen to issue from the crannies legions of bugs of gigantic stature and of ferocious character. The houses are, indeed, infested with these abominable insects and with fleas, and that to a degree which is almost inconceivable, but a native never seems to be in the least inconvenienced by them. They take no steps to mitigate the plague, or rather to prevent the development of these insects, for a plague they are not to the natives, as they seem to suffer very little from them, and one is almost involuntarily led to the conclusion that they would be uncomfortable without them.

Bugs and fleas seem to be nuisances almost inseparable from buildings constructed of wood, after the fashion of Oriental houses, and their presence is not necessarily indicative of filthy habits on the part of the people.

Turkish houses and, in consequence, Turkish towns contain within them, in a concentrated form, the majority of those things which tend to make houses and towns unhealthy. The invariable cesspool, which is within or contiguous to the

basement of each house, constantly emits a stream of effluvium which, in certain states of the atmosphere, becomes intolerably offensive.* In addition to this, the offscourings of the house are cast into the street, or they are thrown upon the surface of the ground in the open space adjoining the house, where they accumulate, or the surplus runs off along the sides of the building until it reaches the common sewer, the street, and from the surface of the ground thus saturated with decomposing matter, and from the confined streets, noxious emanations are being continually given off. That the health of the persons exposed to an atmosphere polluted from such sources, particularly when in a concentrated state, as in Turkish towns, will be more or less deteriorated seems highly probable, nevertheless, in the main, there is no very palpable evidence (except, perhaps, in the most densely inhabited portions of the larger towns and cities) of such deterioration. This may be accounted for by the considerations, that the families always live in the upper stories of the houses, at some elevation above the ground; that there is commonly an open space adjoining the house, admitting of free ventilation by the access of the winds; and that the habits of the people, both in diet and labour, are temperate.

Sinope is notorious on the coast for its healthiness, not only as compared with other towns on the southern shore of the Black Sea, but also on account of its (reputed) singular exemption from epidemic diseases. No doubt there is a great deal of truth in this notoriety, for the elevation of the town is such as to ensure to it an exceedingly delightful climate. It is at all times a most difficult task to obtain any statistical returns of death and sickness from the Turkish authorities, and little faith is to be placed in such returns as may be got unless there may be some collateral method of testing them. I obtained from the Registrar of Sinope the following returns of the male population above six months of age (the Turkish census being, I believe, solely confined to that portion of the population) and of the deaths among them.

| | |
|---|---|
| Male Turks (from six months of age and upwards) within the walls | 1185 |
| Ditto, ditto, outside the walls - - - - - | 267 |
| Male Greeks (from six months of age and upwards) last return 988, but now increased in number, say - - - - | 1030 |
| Total - - - - - - | 2482 |

* The effluvium from the cesspool is not the only nuisance to which it gives rise; for the cesspool of the house in which I was quartered formed a huge nidus for the development of *millipedes*, and, during the spring, the walls of the basement story of the building, within, and of the room which I occupied, were infested by these offensive looking myriapoda in a most disgusting fashion.

The *deaths* among the *male* population above six months of age average from 20 to 30 every year, and rarely exceed 40. This gives a proportion of rather more than *one* death in every *eighty-three* individuals of the male population, at the ages returned, annually. This is a very small mortality, if it be correct, but of this I doubt, from the extremely careless manner in which the records are kept. Moreover, from these returns we obtain no notion of the general rate of mortality among the whole population.

The registrar asserted that during the two months January and February, 1856, the mortality among the male population had been excessive, and he considered that the number of deaths equalled that of the total mortality of the three or four preceding years. It was during the two months named that I had an opportunity more particularly of witnessing the forms and progress of disease in Sinope, and I was forcibly struck with their resemblance to the low types of disease in our large towns. But Sinope had for many months been subject to conditions which were unusual to it. The principal dépôt of the British land transport corps and a commissariat dépôt for cattle were established in the town, and it was inundated with men attached to the dépôts. The resources of the town and country were insufficient to meet the requirements of this great influx of persons (amounting to about 3,500, the principal portion of whom were quartered in huts, together with about 7,000 animals—horses, mules, &c., just on the verge of the suburbs, to the north), and during the winter there was a scarcity of provisions among the inhabitants of the town, and though they were accumulating money to an extent which might almost have satisfied even Greek cravings after pelf, they were unable to obtain any regular supply of meat and vegetables.

The sanitary deficiencies of the town were also much exaggerated while it was thus overcrowded, particularly during the summer and autumn of 1855, when a murrain prevailed among the cattle in the commissariat dépôt, and in the town and country adjoining; and whilst it continued, putrefying carcases of animals which had succumbed to the disease were scattered thickly about the town and suburbs, and the air was filled with foul odours.*

* The murrain, which broke out at Sinope in the summer of 1855, prevailed widely in Asia Minor during the same year. The disease was characterised by a profuse and suddenly set up diarrhœa, and an animal rarely survived more than six hours after it was attacked. The disease resembled cholera in many particulars. For an account of the murrain as it occurred at Sinope, see a paper which I communicated to the Epidemiological Society,

### IV. HABITS OF THE PEOPLE.

I was quartered in the house of a Greek storekeeper at Sinope. My landlord's household consisted of himself, his wife, a dubious elderly personage (who was either a sister, or aunt, or a mother of one of the heads of the house), a sister-in-law, and three children. Now, although the house contained four rooms, the whole of the family were accustomed to live and sleep in one of the rooms only. This crowding together of families in one apartment seems to be common among the lower classes of the East. I found it prevail to a great degree in Sinope and its vicinity, and to have no relation whatever to want of space; for it was as usual among those families who occupied large houses as those who occupied small ones. The inconveniences which might seem to arise from so many persons occupying one apartment, are certainly diminished to their least degree by the mode of life and the simplicity of the household furniture. Their cushions and carpets, which serve for seats by day and for beds at night, are the only furniture of an apartment: hence, the whole area of a room is at complete disposal, there being no tables or chairs to take up space unnecessarily. At meals all eat from the same dish, and each person being provided with a spoon and a piece of bread only, very little room is required to accommodate a tolerably large party. A circular stand, about six inches in height, is placed in the centre of the floor, the requisite number of spoons and pieces of bread are laid upon it, and the dish containing food stands in the centre. Squatted at this low table, each in succession dips his spoon in the dish, and less than half the lateral space is required for eating comfortably than when a knife and fork are used. Even when a family is large, and the crowding greatest, and when persons of all ages, married and unmarried, sleep in the same room, it seems to lead to little or none of that impropriety of thought or immorality which is witnessed, under similar circumstances, in our own country. That ill-directed energy of thought which results, particularly in the ignorant, from much association, and from that extreme freedom of intercourse which prevails among the young with us, is altogether wanting in Asia Minor; and beyond the great towns, and, indeed, in them there would appear to be little immorality among the young of different sexes.

The crowding together of families has, moreover, certain

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and which is printed in the Appendix to Dr. Greenhow's "Report on Murrain in Horned Cattle", *Blue Book*, 1857.

advantages; for in the colder seasons of the year, it tends materially to maintain the warmth necessary for comfort during the inaction of the night. The oriental has a most imperfect notion of the use of fire for any other purpose than that of cooking victuals. The manner in which he manages a fire for cooking is a perfect study. With a handful of embers and a few sticks he will keep his fire in a constant glow, and contrive to cook several dishes at the same time in the most delightful fashion. The fact is, that he cooks the majority of his dishes with a heat short of the boiling point—the great secret of cooking most things well. Thus it happens that he uses little fire, is an invaluable servant during a campaign, and is readily taught to become a capital cook; but he comprehends only in a slight degree the use of fire for warmth. It matters not that he may have a superabundance of wood: I have seen Greeks and Turks, in bitterly cold nights, wrapped up in their great coats, and shivering over a handful of half-extinguished embers, when an unlimited supply of wood has been within a few feet of them. Ignited charcoal is the favourite agent with the oriental for heating rooms during the winter. The charcoal is fully ignited in the open air upon a stand, made of earthenware or brass, and called a *mangal;* when the charcoal has attained a white heat (for previous to this it gives off dangerous fumes) it is carried into the apartment. One or two of these *mangals,* bearing incandescent charcoal, are used according to the size of the room, and the ignited charcoal is replenished as often as may be necessary. The family sit round the *mangal,* eking out the heat which it gives off by additional clothing, the men burying themselves beneath large overcoats, lined with sheep-skin or fur. During very cold weather, when one has nothing to do but to crouch over the *mangal,* enveloped in any amount of clothing, and to hunt after the heat, doubtless it may be found to a certain extent; and again, with a sufficiency of *mangals* a room may be actually warmed; but under ordinary circumstances the *mangal* is a grave delusion, and to an Englishman, who delights to throw all upper clothing aside when he enters an apartment, it is a bitter snare. The heat which a *mangal* gives off is generally accompanied with a faint and unpleasant smell, and it is also of so oppressive a character that it takes some time to get accustomed to, and to tolerate it with comfort. But a good fire blazing upon the hearth and beneath the large chimney (if the room possess a hearth and chimney), or in a capacious stove, is not a sure defence against cold in a Turkish house, as there are so many ways by which the

external air can get entrance into the flimsy wood buildings that at times the cold will set the warmth at nought.

The long coat of sheep-skin, or thick cloth lined with fur, which is commonly worn by all classes of men in Turkey, is an admirable article of dress, and it is an excellent plan for the traveller to adopt it, and to follow the oriental custom of wearing the coat in the early morning, during the evening, and when rain is falling, in the finer seasons, when inactive. For under the hot sun of Turkey the skin acts excessively, and becomes very susceptible of morbific influences; and when towards evening lassitude and languor steal upon one, and the cool evening breeze is revelled in; or after a hot night, when the morning breeze is gladly welcomed, the reduced temperature caused by the wind, slight though it may be, is sufficient to act unfavourably upon the over-excited skin, and to induce diseases of a very formidable kind. The adoption of the long-coat, which is too loose to incommode one when at rest, and which may be wrapped round one so as to shield without occasioning undue warmth or inconvenience, at once diminishes the chance of harm from this source very greatly. Englishmen are exceedingly apt to suffer from carelessness in this respect. It is particularly delightful in an evening during summer to lounge before the open window, or upon the soft sward, with the dress thrown open, or in part cast aside, and to experience the delicious sensations excited by the breeze after an intensely hot day. But how common it is for an exposure of this kind to be followed by rheumatism, fever, or diarrhœa! It is never to be forgotten that the wind, in addition to the evils which it may occasion by a diminution of temperature acting upon a susceptible surface, in most parts of the East sweeps over tracts of uncultivated, or imperfectly cultivated, land, or marshes, and it is too apt to bear insidious poison upon its wings, and to find the traveller, particularly if he has been abiding for any lengthened period in the vitiated atmosphere of an Eastern town, an easy prey. Nay, even the sea-breeze is not to be trusted heedlessly, for some of the foulest and most malarious portions of Asia Minor extend in narrow strips along the sea-coast.

Most Turks and Greeks sheathe the skin from the neck to the knees or ankles with cotton, and it is a very necessary precaution in the East to wear under-garments of cotton or flannel, as a protection against sudden diminutions of temperature (positive or relative), particularly during the hotter seasons of the year when the inordinately excited skin is highly sensitive to changes of temperature. There is another

custom, which is perhaps most common among the Turks, and which may also be wisely followed, and that is the spreading of a carpet between one and the ground when sitting in the open air upon the sward.

Cleanliness is a marked characteristic of a Turkish or Greek house within, notwithstanding the profusion of insects, and notwithstanding the filth without. The latter is suffered from ignorance of its effects; the former is an evil, perhaps, inseparable from wood buildings. It does not do to compare the notions of cleanliness of an English with those of a Greek or Turkish housewife. The former seeks the extreme of cleanliness through a multiplicity of dishcloths and towels; the latter simplifies the matter somewhat, and probably sees no reason why one cloth should not do all the duty of cleansing the whole of the vessels in the establishment. Greeks and Turks are, however, essentially cleanly in their houses and persons, under ordinary circumstances. Indeed, personal cleanliness is a supreme law among Mussulmen, and the modern Greek appears to have a high notion of its virtue. Tradition records that Mahomed asserted that *the practice of religion was founded on cleanliness, and that it is the one-half of faith, and the key of prayer.*—(Sale). Among the poverty-stricken and those of degraded habits, a want of cleanliness may be met with, as is generally the case elsewhere; and rarely is filthiness, either of person or habitation, more repulsive than when it is seen in the East.

The value of water is, as might be expected from the precepts of the Mahomedan religion, nowhere more thoroughly appreciated than in Turkey. Fountains abound in the towns, and every care is taken to keep the aqueducts leading to them in good order; and in the country almost every spring is protected, and the water conducted into a basin. Sinope is plentifully supplied with fountains, and to each fountain is attached, by a chain, a metal drinking vessel, or a wood cup is placed in a recess of the masonry. Notwithstanding, however, the numerous fountains in Sinope, it must not be supposed that the supply of water is superabundant. It meets the uses which the inhabitants make of it; but the slender streams which run from most of the fountains, and the labour of carrying the water, prevent that free and copious use of the fluid which would be requisite for cleansing thoroughly the vicinity of the houses as well as the streets.

The method of cooking usually practised both by Turks and Greeks, and the times of eating, are certainly very excellent. But there can be little doubt that flesh-meat and vegetables

enter sparingly into the diet of the bulk of the population of Turkey; and that rice, butter or sheep's-tail fat, and bread, are the staple articles of food. Rice and butter are very admirable things in their way, and a number of capital dishes may be formed from them, with the help of a few condiments, —dishes that will thoroughly satisfy the appetite, but it is doubtful whether they are sufficient to maintain a perfect state of the health, when they are made, along with bread, almost the exclusive articles of diet, flesh-meat and vegetables being used only at rare intervals. I suspected often that many cases of severe scrofulous disease which I saw in the East, and even the indolent habits and inaptitude for continued exertions of the majority of the people, depended a good deal upon the diet being mainly farinaceous. These are questions, however, which could only be dealt with satisfactorily under more favourable opportunities for observation than I possessed, and by a more systematic inquiry than I was able to make.

Stewing is the typical mode of cooking in Turkey, and although meat may not retain so much of its nutritive property when stewed as when roasted, still when joints, as a rule, are impracticable, and when it is requisite to economise to the full the meat at disposal, no form of cooking equals that of the stew-pot. The combinations which may be made in that vessel, by which meat and vegetables or farinaceous matters are brought into most pleasant and desirable connexion; the mode in which, by means of it, the proportion of meat may be kept in due and proper relation to other articles of food; and the satisfactory manner in which dishes concocted in it appeal to the palate and the stomach, are advantages which cannot be attained so well by any other method of cooking, and which go far to render of no effect, if they do not set aside altogether, the evils which might arise from a deficiency in the chemical constituents of meat subjected to such a process of preparation. It would be well if the stew-pot were more commonly used for the preparation of food in this country, particularly among the labouring classes.

The periods at which the principal meals of the day are taken are early morning and sunset. In the East, as elsewhere, the number of meals taken daily is governed by the duties of the individual. It rarely, however, exceeds three, and usually the number is confined to two; but, under any circumstances, the principal meals are eaten early in the morning and in the evening. The times of eating must necessarily be regulated by the duties of the day, but the plan which is followed by all classes in Turkey appears to satisfy well the physiological requirements of the system.

## CHILD-MURDER IN ITS SANITARY AND SOCIAL BEARINGS.

By WILLIAM BURKE RYAN, M.D.Lond.;
Fothergillian Gold Medallist for an Essay on "Infanticide in its Medico-Legal Relations."

In order that the sanitary and social inquirer, whose business it is to prevent untimely death in any shape, and to whom the question of infanticide peculiarly belongs, may properly appreciate this grave subject, it will be necessary to recall to his mind the extent to which it prevailed in different ages of the world's history, and to glance at causes which have influenced deeds that must appear, at least to Christians, as a cruel war with Nature and a sin of the deepest die. I consider it utterly impossible properly to treat of infanticide without viewing it in all its moral bearings; for assuredly it is of the most vital importance to a Christian nation to eradicate, if possible, the smallest tendency to such a crime from the minds of its people. I say, to a Christian nation, because all, or almost all, Pagan nations and peoples, who were uninfluenced by feelings of accountability on the matter, either observed the practice as part of their codes of laws or followed it from feelings of superstition, as an affair of convenience, from the pressure of want, or even from fashion. And facts and figures, in which the sanitarian delights, prove incontestably that Christianity has done more than any other institution—nay, than all institutions put together—to stem the torrent of infanticide.

There is a growing feeling of uneasiness abroad upon the subject of infanticide; the popular mind is disquieted by the conviction that our land is far from blameless, nay, is most culpable, in respect to this crime. There are few sections of the community, if they rightly direct their minds towards it, that may not lend a hand to put it down; but the medical profession, from the habits, the influence, and the opportunities of its members, is particularly powerful. Let them never forget their mission!

Infanticide,* from whatever motives, presents murder in one of its most revolting forms, whether perpetrated wholesale, as in ancient and modern Pagan nations, or in sometimes more than isolated cases in civilized communities.

Before and after the deluge, the heathen gods, or demons, had human sacrifices offered to them, especially of the children of those sacrificing; and we learn from Sanchoniatho, Pau-

* Lycophron is the authority for the Grecian deity being called *Infanticida*, which was thought to have been applied to Hecate or Diana in one of her other forms.

sanias, and other ancient authors, that such sacrifices were common in Phœnicia and in Egypt. The ancient kings of Tyre offered their sons in sacrifice, and the ancient Syrians sacrificed to Jupiter and Juno, destroying their children without mercy.

We do not find any specific punishment in the laws of Moses for infanticide, and reasons exist to make us infer that the crime was unknown amongst the Jews. The expectation of the Messiah must have acted as one great cause, and besides, as remarked by Dr. Priestly, the purest morality was the principal object of the system of Moses. Tacitus, with all his enmity to the Jews, acknowledges that no man was allowed to put his children to death.* I am informed, by a Jewish friend, that the detestable crime is almost unknown amongst the Jews of the present day, This, equally with its prevalence in Pagan countries, is a great fact for the sanitary observer.

When the Jews, however, freed themselves from the law, and held intercourse with the surrounding idolatrous nations, amongst whom immolation of children at the shrines of their deities was most extensive, they erred grievously in this respect and sacrificed their sons and daughters.

The practice of burying children alive in ancient Persia was, according to Herodotus, common. The same author says, it did not exist in Egypt in his time, but there is little doubt that the practice at one time existed. The proofs afforded by Sir John Marsham and Bishop Cumberland induce Whiston to believe that human sacrifices were common. It is said that the practice of abortion and infanticide, particularly the former, prevails very much at the present day, and that there are professors for that purpose among the women. At Cairo Arabian physicians follow the horrid practice as a profession.

The Greeks, with the exception of the Thebans, quickly disposed of their children, either by exposure or death. The Thebans held the crime in detestation, and made its committal a capital offence—offering, in this respect, a marked contrast to the Athenians.† State reasons chiefly influenced the practice, weak and sickly children being considered as likely to be of no use. Some, as the Pelasgians, offered every tenth child as a sacrifice of propitiation in times of scarcity.

The Carthagenians, like their ancestors of Tyre, immolated children, and Gelon, king of Syracuse, as well as the Roman people, endeavoured to stop these sacrifices. On being besieged

* Nam et necare quemquam ex agnatis nefas.

† "Contra morem legesque reliquorum Græcorum et imprimis Athenienſium." (ÆLIAN.)

by Agathocles, they sacrificed two hundred of the children of their most illustrious families.

The nations of the North, the people of the Baltic, Servians and Scandinavians especially, sacrificed to Thor and Woden.

In early Rome, paternal authority was sanctioned in almost its highest degree, the father having all but absolute authority over his children. Exposure and slaughter of children were rife; these being abandoned and destroyed in various ways,—sometimes given up to wild beasts, sometimes thrown into rivers. The absolute "patria potestas" was restricted under the emperors.

That licentiousness, in progress of time, was extreme, we learn from Juvenal and the other satirists and authors of the period, as well as that the practice of abortion was very frequent. In the time of Constantine the practice of infanticide was very prevalent and on the increase, owing apparently to distress; and on this emperor becoming Christian, he caused laws to be enacted, whereby funds were allotted out of the public treasury to parents overburthened with children, in order to take away the temptation of suffocating, or exposing them to be sold; and also according the rights of property in the exposed children to those who had the charity of taking pity on them.

During the fearful persecutions to which the early Christians were exposed, calumnies of all sorts were unsparingly heaped upon them, and amongst the rest it was asserted that they devoured children at their meetings. This groundless calumny was triumphantly refuted by the Christian fathers of the day, as well as by Minucius Felix, a lawyer (cap. xxx, Oxon. 1627, p. 98), who boldly hurled back the calumny on the heads of their accusers.

Although Tiberius, in the third century, tried to put a stop to the practice, and caused the pagan priests who presided at the sacrifices to be hanged upon crosses made of the trees that shaded their temples, it approached the fifth century before it was put down.

Thus, then, we see that the murder of children was very general in ancient times; that it was palliated and excused on grounds of necessity, and allowed by lawgivers and philosophers of different countries. We see, as is acknowledged by Gibbon, that the destructive flood was first stemmed by the gentle influence of the Christian religion, which even in its infancy tended to arrest horrors so rooted and so general; as well as that this influence was insufficient until "fortified by the terrors of capital punishment."

It is stated by writers that the Mahommedan invaders of

many countries did, at all events, one service, that of prohibiting child-murder. This one good, remarks Colonel Walker, resulted from the imposture of Mahomet; and certainly the Koran expressly forbids the crime:—"Kill not your children for fear of coming to want; we will provide for them and for you: verily the killing of them is a great sin." Sir John Chardin, however, says that the Mahommedan Tartars, when they cannot maintain their children, think it a charity to murder them when newly born, as well as when sick and past recovery. Many other authors show that they allow the practice, but that its frequency is lessened by the universal custom of procuring abortion, a crime so strictly of a pagan character.

Our peculiar relations both to India and China make the subject of infanticide in these countries of great interest to us, particularly as regards the former, on account of the great, and in many respects successful, efforts of the English nation to stop the practice there.

Hindostan appears to have been some time since the great field of slaughter of female infants. This was particularly the case among the tribe of Raj-Kumar, which deduced its descent from the ancient princes of Delhi, and numbered about 40,000. The shame felt upon being unable properly to apportion their daughters in marriage is said to be the chief reason, and the modes of causing death are various. The custom of drowning female infants exists in Kutch, in the peninsula of Guzerat, among the Kalowries of Scinde and others. The custom does not descend to illegitimate children, as they will not have to portion such as these. So savage are some of the women, that even when married to Mahommedans they continue the practice, and this against the religion and wishes of their husbands, in order to advantage the tribe to which they belong. It was said, but with every appearance of exaggeration, that in *Kutch* and *Kuttawar* 20,000 were murdered annually, but it was believed that in *Guzerat* 5000 perish yearly. In Kutch, Hallar and Matsyn-Kantha, one account places the infanticides yearly at 30,000, another at 3100, but Colonel Walker says this number is as short of that destroyed as the other is beyond it.

With the Raj-Kumars and other tribes of Bengal the crime was prevalent, but has been abolished; also among the Rhatore Rajpoots of Jeypore and Jondpore, as well as among the Jaut and Mewat tribes of Hindostan. The children are dropped immediately after birth into holes filled with milk, or the placenta is put on the mouth till the child expires, or opium is put on the nipple, which the child sucks in with the milk and dies. The means taken by Governor Duncan and Colonel

Walker have been very successful in stopping this custom, and are highly creditable to them, as well as to the English nation, which empowered them to act, but it is to be feared that nothing short of the introduction of Christianity will ever permanently overcome the evil. Sir W. Sleeman shows that these murders are still very frequent.

The prevalence of at least female infanticide to a very great extent casts its dark shadow over the Chinese character. Authorities are at variance as to the number yearly murdered—cut in two or poisoned, perhaps in order to obtain a plentiful harvest, or destroyed for one reason or another. The practice of drowning is general, says Gutzlaff. In recent communications from Dr. Williams and Sir John Bowring, we find that in many parts of China there are towers where children are thrown into a hole made in the wall, and it is said, on the authority of Father Ripa, that of abandoned children, the Jesuits baptized in Pekin alone not less than 3000 yearly. Dr. Williams says he has seen ponds which are the habitual receptacle of female infants, whose bodies lie floating about on their surface. Meanwhile, their penal code prohibits infanticide. Sir George Staunton, as well as Du Halde, found exposure of children very frequent in Canton and Pekin; they estimate the number in Pekin alone at 2000. Facfur, a prince of the province of Mangi, saved 20,000 annually of children exposed through the poverty of their parents. Barrow states that from 10,000 to 20,000 annually are exposed, slaughtered, or interred alive throughout the kingdom; the Abbé Bergier places the number at 30,000. Exposed on the highways, they are either trampled to death by animals or devoured by vultures.

In Arabia female children are frequently murdered. The Niam-Niams, an African race, devour, it is said, the children of their enemies. In some parts of America, among the aborigines, Robertson says, when twins are born, one is destroyed, and when the mother dies while nursing, the infant is buried in the same grave. So also in New Holland. In Greenland, Labrador and California, children were destroyed during times of scarcity.

In Mexico, almost fabulous numbers are given by Torquemada, Zumurraga and others, as being sacrificed annually, 20,000 even being named. The Peruvians were said by Acosta to rival the Mexicans in the slaughter of children. In South America, in New South Wales and in New Zealand infanticide is common. The same may be said of some of the South Sea Islands,* Japan, Ceylon, Madagascar, and many other places which I must leave untouched.

* It is stated on good authority that in Otaheite two-thirds of the children

By infanticide, in medical jurisprudence, is understood the murder of a new-born child, but there is no specific time named to which the term "new-born" applies, the term not being restricted to days after birth. Trials in such cases are conducted as those of ordinary murder. Proof is required that the child was *wholly born* and had an existence independent of the mother. The laws have varied much in this country at different times regarding infanticide. The Act 21 James I, where a bastard child was born dead, required proof on the mother's part that the child *was* born dead—in default of which she was visited with punishment. This statute was so unjust and inhuman that it could not long remain law, especially as the punishment for the offence was no less than death, The laws against infanticide all over Europe, or nearly, were formerly of extreme severity, and the above act seems to have been adopted from the French criminal code. In France, in 1556, by an edict of Henry II, every unmarried woman who concealed her pregnancy and caused the death of her infant, was herself condemned to death. Immaturity of the child formed a sufficient defence. This law, like our own, has been modified. Immaturity in this country also forms an efficient defence, but the accused must give this proof. Maturity of the child is necessary in order to establish the crime of concealment of pregnancy, which takes the place of child-murder of former times, and is punished with two years imprisonment at the utmost. Concealment of pregnancy and birth is not often made the subject of prosecution, but where an indictment is laid for murder, and the proofs fail, although the case is very suspicious, then the law falls back upon concealment, for which the accused may be tried. In 1803 an act was passed, which provided that women tried for the murder of bastard children are to be tried by the same rules of evidence and presumption as by law are allowed to take place in other trials of murder, leaving power of a second trial for concealment if the first failed. This statute was modified by the Act 9 George IV, where on proof of concealment of birth, it was not necessary to show whether the child died before or after birth.

The stream of prejudice now runs on the other side, and there is no crime that meets with so much sympathy, often of the most ill-judged kind, as that of infanticide, and this sympathy seems to have seconded, if not guided, the law in this respect. An almost partisan feeling has often been evinced,

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were destroyed before the introduction of Christianity, and that there were few women who had not embrued their hands in the blood of their children. So of Japan, etc.

not only by the legal, but even by the medical profession. To this must be added the great difficulties attendant on the medical inquiry as to the cause of death in these cases, but above all that almost insurmountable difficulty thrown on the medical witness, which requires him to prove whether, in case of death, the child has been *wholly born* when the violence had been committed. All the other obstacles in the way of proving that a child lived are bad enough and difficult enough, but yet legitimate subjects of medical inquiry; but this last seems purposely left open by the law, a back door for the escape of the guilty mother. It is not sufficient that the medical witness prove the child to have breathed at or about the time of birth —it is absolutely necessary, under the present state of the law, to prove that the child was alive when *wholly born*, that life existed after the body came into the world, as shown by the state of the lungs, etc.; so that in truth the killing of the child *during birth*, although it breathes and lives, is not murder *in law;* and although injuries of a deadly character may appear, yet unless a medical man can prove that the child was *wholly born* when it was killed, the accused must be acquitted. That this is the state of the law has been frequently ruled. Baron Gurney stopped a case when he elicited from the medical witness that a child might breathe during birth; and it was ruled by Mr. Justice Coleridge, at the Norfolk spring assizes, 1837, that the whole body of the child must be born in order to have an indictment for child-murder stand. Mr. Baron Parke has gone even further. He said, at the Herts Lent assizes, 1841:—"With respect to all these cases, there is a degree of doubt whether the infant has been *born alive*. The law requires that this should be clearly proved, and that the whole body of the child should have come from the body of the parent. If it should appear that death was caused *during delivery*, then you will not find a true bill."

In the *Provincial Medical and Surgical Journal*, April 23d, 1845, is reported an extraordinary case where Mr. Justice Erle laid down the law and distinguished between medical and legal life. In this case it was shown that the child had breathed, and its head, when found, was nearly cut off. The jury were told that before they returned a verdict of "Guilty," they must be satisfied that the child had an existence distinct from, and independent of, the mother; that it was, in fact, *wholly born* when murdered by her. That the child might have respired before it fully came into the world, and that although such might be, *medically*, a live child, yet that it was not so *legally*. Of course the jury acquitted the prisoner.

Hear the following case. At an assizes, 1855, Jane Perry was charged at Gloucester with the wilful murder of her male infant. On the surgeon entering the room, she was in bed with her head on the bolster, underneath which was a dead child with its throat "divided by some instrument," but the surgeon could not say positively whether the child had been *born alive.* In consequence, Mr. Baron Martin said the prisoner could not be convicted of murder, and the jury in consequence found her guilty of endeavouring to conceal the birth of the child.

I need scarcely say that this state of the law throws a great responsibility on the medical witness, I may add a responsibility which should not be thrown upon him; for it is generally utterly impossible for him to give the proof required; and in fact, once that he has given proof that the child was alive at the time that violence was offered to it, *there his duty, as well as his power,* seems to cease, as it is almost as much in the power of non-medical as of medical witnesses to say whether the child was or was not *wholly born* when violence was offered. Some additional circumstances, some corroborating witness must be looked for in order to the conviction of the accused. The medical witness has to depose to certain facts and to answer certain questions—beyond that his jurisdiction ceases, and he can show no leaning one way or other; the jury hold the scales, and they must determine.

The present state of the law seems equally unfair towards the jury. They have no alternative but to convict the accused of murder or to acquit her, and there are but too often, unfortunately, in the circumstances of the unhappy woman tried for her life facts that appeal to their commiseration. Seduction, perhaps with desertion and misfortune of one kind or other, plead, and properly plead, on her behalf, and a verdict of "Wilful Murder" is scarcely ever returned, but the jury fall back upon the power left them and return a verdict of concealment of birth. But often this verdict does not appear commensurate to the amount of offence proved, and it appears desirable that a modification of the law should take place as regards the crime. The crime of infanticide is but too frequently accompanied by the most determined and cold blooded calculation, and where this great repugnance to capital punishment is felt, juries and judges should have much stronger powers than they have at present. The law in France would seem to meet this point by finding for the capital offence "with extenuating circumstances." This would enable the judge to measure out the punishment according to the nature of the

conduct that accompanied the crime, and might generally meet all the requirements of justice. "Two years imprisonment," says Dr. Taylor, "is substantially the punishment at present inflicted for the crime of infanticide in this country; for it is not to be concealed that, *medically* speaking, these technical points relative to 'live birth,' to 'entire birth,' or 'to an independent circulation in the child,' or lastly, 'to concealment of birth,' are only so many ingenious means for evading convictions on the capital charge." A modification of the law like that alluded to, Dr. Taylor adds, "appears to be necessary, unless we are prepared to admit that the destruction of a living and breathing child *during* the act of birth is not a crime." May it not be asked what a mockery of justice is this state of the law, what a tampering with life, and what an inducement to murder? Every man, perhaps, of a jury believes a prisoner guilty of murder, but because they have not proof that the child was *wholly born*, that is, entirely separated from the body of the mother *when it was killed*, they acquit her. This state of the law is no secret to some of those who intend to benefit by it, and perhaps no more important subject of legal medicine can be brought before the profession and the public for calm and impartial reconsideration. The laws of Prussia are pretty much on a par with our own as regards infanticide, and the difficulties in the way of conviction, as well as the unwillingness of juries to convict, are very similar.

In March 1857, Lord Raynham moved in the House of Commons for a return of the number of persons convicted of infanticide from 1852 to 1856 inclusive, together with the sentence passed upon each; if modified or reversed; and specifying also whether the verdict had been accompanied by a recommendation to mercy, and if so, the reason or reasons, if any, alleged, etc. Returns not yet printed have been made, but they give very little information. The strange fact, however, appears in some of them that the clerks of assize had no means of answering whether the sentences had been modified or reversed; as well as that it was not customary to minute the jury's recommendation to mercy. One clerk says, "I hardly know what is intended by the word *Infanticide.*"*

The return made by the clerk of assize of the Home circuit in these years is marked "*none.*"

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* It will be here also remarked, that the returns give only the *convictions* for infanticide—not the absolute trials, much less the trials for concealment of birth. Proper returns from Coroners' Courts are what we are most in need of; these courts are the true sources whence to build up the statistics of infanticide. Such returns were moved for in the House of Commons in 1852, but never made.

The *only* case of a conviction for the murder of a child was at the Surrey Lent assizes, 1852. The punishment is not specified; nor is it in another case at the same place, where a woman was convicted of manslaughter on an indictment charging her with infanticide.

In the Midland circuit, 1853, Mary Ann Parr had sentence of death passed upon her at Nottingham, but it was commuted to transportation for life. Ann Tommey was indicted for wilful murder at Warwick, 1853; found guilty of manslaughter. The sentence twelve months imprisonment with hard labour. At Lincoln, 1855, Elizabeth Lownd was indicted for wilful murder. She was transported for fifteen years. At Derby, Eliza Beastall was indicted for a similar offence, and was imprisoned with hard labour for two years.

*Northern Circuit.* Jane Gillie: sentence of death recorded;—punishment, transportation for life.

*Norfolk Circuit.* One woman sentenced to death;—punishment, transportation for life.

In Lancaster, one indictment; result not stated.

*Oxford Circuit.* 1. Abel Ovens: child six weeks; sentence, to be hanged;—punishment, transportation for life. 2. Eliza Dore: similar sentence, similar commutation. 3. Mary Robins: ditto, ditto. 4. Sarah Baker: child two years; ditto, ditto. 5. Maria Tarrant: child three months; ditto, ditto.

*Western Circuit—Cornwall.* Richard Jose, jointly with the mother and another person: verdict, manslaughter;—punishment, transportation for life.

*South Wales.* None.

*Chester and North Wales.* 1852. Margaret Davies, county Denbigh: convicted of murder; sentence, death;—result not stated.

*County of Chester.* 1. Indicted for murder; conviction, manslaughter; sentence, seven years transportation. 2. Indicted for murder; convicted of murder; sentence, death;—commuted to transportation for life. 3. Indictment for murder; convicted of murder; sentence, death;—punishment, transportation for life. 4. Same indictment; same conviction; same sentence;—result, transportation. 5. William Jackson: murder of his two children, five and seven years of age; same indictment; same conviction; same sentence;—result, hanged.

That the crime of infanticide, as well as that of criminal abortion, is wide spread and on the increase, is, I fear, but too certain. We have only to look to the daily or weekly papers to be painfully convinced of this fact, as well as that it will require a strong hand to put it down.

"The 'Circuit Calendars'", says the *Legal Examiner* 1853, "exhibit, as usual, a number of cases in which infants have met their deaths at the hands of their mothers." It adds that "there is a horrible resemblance between the nature of the circumstances attending these deaths; but that there is one difference—that they are more numerous than they used to be. The public, as well as the judge and the bar, notice it; and Mr. Justice Coleridge pointed it out to the grand jury at Worcester." "We shall soon", continues the *Examiner*, "rival the Chinese people in callousness to infant life."

See what inquiry brings forth amongst a Christian people. Look at the *Sanitary Inquiry Report*, Supplement, "Interment in Towns, 1843", by Edwin Chadwick, Esq. In the Manchester and Salford district, the minister was often shocked by a common phrase amongst the women of the lowest class, in alluding to children—"Aye, aye, that child will not live; *it is in the burial club.*" The actual cost of a funeral being from £1 to 30*s.*, and the allowance from clubs in the above place being from £3 to £4, and even £5, a balance is left to tempt the demon parents. Moreover, it was customary to insure a child in four or five of these burial societies; and it was stated that one man had actually insured such payments in nineteen different burial clubs in Manchester.

Mr. Gardiner, clerk to the Manchester union, deemed the cause assigned by a labouring man unsatisfactory, and refused to register a death. On inquiry, he found rumour had attributed the death to wilful starvation. The child had been entered in *at least ten burial clubs;* and the parents had six other children, who only lived from nine to eighteen months respectively. They had received £20, from several burial clubs, for one of these children; and they expected to receive as much for this child. The child had no medical care. The jury thought the evidence of the parents made up for the occasion, and not entitled to credit. The verdict was, "Died through want of nourishment; but whether occasioned by a deficiency of food, or by disease of the liver and spine, brought on by improper food and drink, or otherwise, does not appear." After this verdict, the man enforced payment from ten burial clubs, obtaining £34 : 3 : 0.

Two similar cases came under the notice of Mr. Coppock, of the Stockport union, in both of which he prosecuted the parties for murder. In one case, where three children had been poisoned with arsenic, the father was tried with the mother, and convicted at Chester. He was transported for life: the mother was acquitted. In the other, although the judge summed

up for a conviction, the accused, the father, was to the astonishment of every one acquitted. The body of the child was afterwards exhumed, and arsenic found; as was also in the bodies of other two children of the same man. In all these cases, payments were enforced from the burial clubs. It was remarked of these dreadful cases by the superintendent-registrar, that the boys, as being likely to be of use to the parents, were spared; while the female children were the victims. It was the clear opinion of the medical officers that infanticides were committed in Stockport in order to obtain money. A Liverpool woman named Eccles was convicted of the murder of one child, and was under the charge of poisoning two others with arsenic. Immediately after the murders, she went to demand of the burial societies a stated allowance. Cases of culpable neglect of children who were thus insured had been observed at Preston. The collector of one of the most respectable burial societies in Manchester had strong grounds for believing that it had become a practice to neglect children for the money allowed. A vast number of frauds have been perpetrated on the different societies in this manner.

"I have no doubt", says the town-clerk of Stockport, writing in 1843, "that infanticide to a considerable extent has been committed in the borough of Stockport." He prosecuted in two distinct charges; one victim being sixteen years of age, and unlikely from weakness to be serviceable to her father. An inquest was held, and a verdict of natural death returned. In three months afterwards, the body was exhumed and a very large quantity of arsenic detected. Mr. Justice Coleridge summed up for a conviction; but the jury acquitted the prisoner. A verdict so extraordinary, it was remarked, could only be accounted for by the general feeling against capital punishments, which enables so many criminals, capitally indicted, to escape punishment. This man received £8 from burial societies, and freed himself from the burthen of the poor girl's support. The other case involved no less than three distinct cases of murder. Robert Sandys and George Sandys, with their wives, were the accused, their own children being the victims. They were all in burial societies.

Dr. Granville, in his work *Sudden Death*, compiled from the Annual Reports of the Registrar-General, thinks the vast mortality amongst children must be looked upon with great suspicion. He says: "Frightful as this early destruction of human life must seem in the abstract, I grieve to add that, as we come nearer to the present times, not only does the general amount of life thus extinguished, as it were, on its threshold,

increase, but the increase appears under circumstances capable of inspiring grave suspicions of its not being altogether natural. Thus I find that the early destruction of life is greater in certain manufacturing districts than in purely agricultural localities." In alluding to verdicts of "found dead", "accidentally overlaid", "suffocation from having taken an over quantity of mother's milk, she having fallen asleep while the child was sucking", and such like, he says: "Now, in all cases where the preceding verdicts were delivered, either the children were illegitimate, or the parents steeped in poverty," etc. He thinks that the large mortality of children under one year throughout England and Wales during the years 1847-8-9 (267,086), calls for some serious investigation into its origin and causes. He adds: "And let the legislator and moralist look to it; for, as sure as there is in any nation a hidden tampering with infant life, whether frequent or occasional, systematic or accidental, as in the cases of the poisonings in Essex, or the burial-club iniquities, so sure will the chastisement of the Almighty fall on such a nation. . . . In some parts of England", he adds, "the manufacturing towns, to wit, such as Manchester, Ashton, Preston, Leeds, etc., this early mortality may be rightly called frightful."

"The natural instinctive horror of blood", says the *Morning Chronicle*, "the reverential sense of the sacredness of human life, seems to be becoming extinct among the humbler classes."

Mr. Hilles, in the *Legal Examiner*, considers that the crime of infanticide has spread to a fearful extent, and seems to be extending rapidly amongst the humbler classes of society. He doubts whether the closing of Foundling Hospitals in this country has not been more injurious than otherwise to public morals.

The most exaggerated statements take place as to the number of exposures and infanticides in London alone; and I saw some time since, in a medical publication, the number placed at eleven hundred: but, from other and surer sources, we can learn that the amount of murders is very great. Thus, in the papers of about three months since, Mr. Coroner Wakley is reported to have said that three hundred deaths by infanticide take place annually in London, although many are returned as dying from other causes, "still-born," etc.; adding, that with ten thousand pounds at his command, he could put a stop to the iniquity. Surely would freedom from such a system be cheaply purchased at a much larger sum. As a commentary on this, in the Registrar General's Weekly Return for about the third week of April last past, six deaths are given as by "suffocation"—*five of these being infants.* The death of none

of these may have been caused by foul means, but when such numbers often meet the eye, they must give rise to suspicion.

With regard to the crime as it was said to exist under the burial-club system, a person should think that no commiseration could be entertained towards parents who could coolly plan and plot, day after day, the murder of their offspring. Sympathy for that class would be false indeed, and only tend to encourage them in their bad tendencies.

The case is different with an unfortunate girl, maddened perhaps by overwhelming shame and a sense of wrong, and all excuse that can be made for the deed of a woman in such a position, short of excusing actual murder, she should have the benefit of; but as long as the laws of the country treat the crime of infanticide as they do at present, the medical witness will often have a difficult task to perform. He cannot become the partisan of any criminal; but having a sacred duty to discharge, he will have to sift the circumstances, extract the truth and depose to it, and then leave to the juries of the country the task of pronouncing as to guilt or innocence. He will not fail in these, as in all other cases where there is any doubt, to do all he can to have the accused get the benefit of it, but he will not strain truth for this purpose. He will recollect that there can be no crime of a more dreadful nature than murder, and that no excuses beyond those that can be truthfully made should be made on behalf of any one guilty of the crime. The great obstacle thrown in the way of justice in these cases consists in the fact that it is not sufficient for the medical witness to prove that the child breathed at or about the time of birth. The present state of the law renders it absolutely necessary to prove that the child was alive when *wholly born*—that life existed after the body came into the world. So that in truth the killing of the child *during birth* is not considered murder in law. A judge has told a jury that if they were of opinion that the prisoner had *strangled her child* before it was *wholly born*, they were bound to acquit her! O, wise laws! This is a strange and anomalous state of things, but the medical witness must take the law as he finds it; he must not go beyond it. There seems too much of fashion in this unwillingness on the part of juries to convict, and it would be well if it were done away with. Look at the inconsistency of juries, as shown by the following case from the papers, where a poor woman, *already dead* from "epilepsy produced by exhaustion," is brought in guilty of wilful murder of her infant. Had the woman lived, I presume she would have been acquitted!

CONCEALMENT OF BIRTH, AND VERDICT OF WILFUL MURDER.

—On Tuesday, an inquest was held at the Calcutta Inn, Gloucester-road, Cheltenham, by J. Lovegrove, Esq., on view of the body of a young woman named Mary Anne Brunsley Gilkes, and on the body of a male child, of which she had been delivered shortly before her death. The case is peculiar, from the fact that the birth of the child was not discovered until after the interment of the mother; and from the medical gentlemen who saw the young woman shortly before her death having given a certificate that she died from epilepsy, produced by exhaustion, no suspicion having been entertained by any one that she had been delivered of a child. Mr. Lovegrove, after the discovery of the infant, issued an order for the exhumation of the body of the mother, and for a *post mortem* examination of both bodies. After the jury had been to the Cemetery dead-house to view the body of the child, the evidence was taken with respect to both cases, and at its conclusion the jury returned a verdict that the deceased Mary Anne Brunsley Gilkes had died from epilepsy, arising from exhaustion, through loss of blood and neglect in her confinement; and that the child had died through the wilful design or neglect of the mother, who was therefore "guilty of wilful murder."

Let the innocent by all means be protected, and let none be visited with, at all events, the severest form of punishment short of death, unless where murder is most clearly proved. Better a thousand guilty should escape than that one innocent should suffer. But when things are fully brought home—when a cool and premeditated murder is proven, then severe punishment should follow; no false delicacy should tempt the public to connive at infant murder. Let no murderess be made a heroine of, and the practice may be lessened. Above all, let women feel that they should not be visited with so much indignation for simple pregnancy as for murder: the one is a sin of the passions, and may be momentary; the other is but too often coolly premeditated;—and if the state of morals cannot be brought to that degree of purity as to prevent illicit intercourse, they can at all events be brought to a state when a woman will long hesitate before she imbrues her hands in innocent blood. Let society, if possible, look on the fact of illegitimate pregnancy with a more forgiving eye, and pity, at all events, the unhappy victims of seduction, or the otherwise innocent who may have fallen. Let such victims have their future course through life of a less hopeless character; let them feel that an occasional flower may be scattered on the thorny path that lies before them, and that a green spot may now and then glad their eyes and give rest to their limbs; that life is

not to be of so wholly unendurable a character as they may suppose ; that it may no longer be from their own sex, that—

"Every woe a tear may claim,
Except an erring sister's shame,"

and much may be done to lessen the evil. The moral criminality of such deeds should by every possible means be kept steadily before the people. This would, indeed, be a meritorious work to undertake.

I incline to the belief that the existence of Foundling Hospitals would conduce much to the prevention of the crime, but there is neither space nor time to enter at length upon the merits or demerits of these institutions. The great points that they may be abused, as when married parents, too lazy to support, wish to desert their children ; or that they lead to greater immorality as to sexual intercourse, I consider light in the scale, if they only put a stop to the more monstrous vice—the more crying evil. I can well imagine that greater laxity of morals as to this intercourse may lead to more illegitimate births in countries where they exist, but I cannot believe that infanticides are likely to occur in equal numbers where hospitals are supported, as in those countries where they do not form part of the institutions. Such an argument for the depravity of human nature I may well hope cannot be sustained ; indeed it would be against all past experience to come to such a conclusion, for it was in order chiefly to prevent this crime that Foundling Hospitals were instituted and kept up by some of the greatest philanthropists of former times.

It is melancholy to reflect that in the ancient days of Rome, many who took to their homes the poor children that their parents made outcasts, did so from a most sordid self-interest, as they often put out their eyes or maimed them in different ways, in order that by exhibiting them in this condition they might induce the charitable to give them money.*

With very different feelings did those who instituted Foundling Hospitals go to work. Their sole object—men and women—seemed to be to put a stop to infanticide, and by throwing the mantle of charity and secrecy over the fallen woman, and showing, by pointing out a mode of support for her child, that her whole prospects in life were not to be ruined by having a dead weight upon her exertions, they took away, once and for ever, the greatest incentives to infanticide. As in the conducting of every other institution for the amelioration of human

* Even Seneca vindicated the maiming of children, on the ground of their being slaves. Justinian, A.D. 530, prohibited the slavery of these unhappy ones.

suffering, it was impossible that such institutions should not be abused. They were abused, and in consequence reformations of various kinds and at different times were had recourse to, and even suppressions were tried, until it was found that infanticides increased in consequence.

A Foundling Hospital was established at Milan as early as the year 787, and one was founded, at least for orphans, in Constantinople, in 1096, by Alexius I. In 1198, Innocent III allotted part of the hospital of Spirito Santo at Rome for the reception of foundlings, in order to prevent infanticide. Austria, Spain, Russia, Belgium, etc. have many such institutions. In France they exist in greater numbers than in any other country, and great care has been bestowed upon them, as well by those who founded them and cultivated them from feelings of pure and absolute charity from the period of 1204, when Guy of Montpellier instituted one, to the time when Napoleon looked to them as a training ground for soldiers to replenish his army, and placed them under the protection of the state in 1789. At one period, as mentioned, they were suppressed in consequence of abuses; and in the reign of Louis XIII, the prevalence of infanticide caused a pious woman, Madame Legras, to institute an asylum for outcasts. She was followed by St. Vincent de Paul, whose zeal and example were all powerful in placing establishments of the kind on a firm basis.

Much has been said for and against such institutions; but the weight of evidence on the entire goes to show that they have done good and have certainly prevented infanticide. In no country where they exist as an institution can it be said, as is said of Sweden by Dr. Webster, viz., that when he visited that country recently, he found 1183 persons in the prisons, and of these not less than 106 were committed for infanticide and 26 as accessory to it, being one ninth of the inmates of these establishments! They are fostered in Catholic, while they are discountenanced more or less in Protestant countries, and it is curious to observe how the arguments for or against are influenced as they proceed from one or other of these sides.

There can be no doubt that when too great facility of depositing the children with absolute secrecy is allowed, as where the *tours* or turning boxes were established, great temptations are thrown in the way of idle, dissolute or unnatural parents to get rid of their superfluous children and throw them on the nation for support; but this as an objection could be in a great degree got rid of, and is indeed by the "*bureau ouvert,*" where registration of the party applying to leave a child is made, at the same time that secrecy is observed.

The registration of illegitimate births cannot in all cases be taken as a gauge of morality, for Sir B. Brodie gives, from the Registrar General's reports, a ratio per cent. of 3·2 for London, while in Derbyshire it is 8·3, and in the North Riding of Yorkshire 9. Now, many causes may exist in London, where the standard of morality is not over high, to account for this ratio; and where, if even the compulsory "retreat of the ten thousand" public prostitutes computed to drive their trade, could be effected, there would still remain the 100,000 non-professed ones that are said to exist, from the luxurious and fashionable Calypso of the elegant suburban villa, who lures "my lord" from "my lady's" more sobered graces, to the sad and lonely child of labour whom gaunt poverty has "worn to the bone", whose fingers are benumbed by plying the profitless needle on mantles remunerating by 1½*d.* each, or on shirts or vests at a similar rate, that those may live in idleness, or worse, whose stony hearts are made stonier still by the cursed and all absorbing love of gain, and who are utterly careless how their ill got wealth increases, what wear and tear of life it causes, so that it *does* accumulate and minister to their selfishness; or for, if possible, those still more blameable, because better educated, scions of fashion who give their short orders for their gala dresses to be ready by the rapidly approaching day when they are to shine "the cynosure of neighbouring eyes", and whose robes should if it were possible be bedecked by the congealed tears—those "pearls of great price"—shed by the friendless girl just bursting into womanhood, who follows her dreary task the live-long night, till heart and soul and hope and feeling are crushed, the world appears desolate and blank, and all is chaos and bewilderment; while the tempter, it may be, steps in and secures his all but unresisting victim. The story is then soon told, and the covetous merchant and the fashionable lady have left another, albeit unacknowledged, legacy to their country.

Much, I conceive, might be effected in ameliorating the condition of women, especially of those in large towns, by laying open to them fields for industry for which they are peculiarly fitted, such as have been mooted in the watch-making movement and others of a similar nature. Women would thus be rendered more independent of general circumstances, without at the same time rendering themselves less feminine in their natures. The right woman might thus be put in the right place; and the custom would not be so general as we see it at present, as in the case of drapers' and other such establishments, of placing the wrong man in the

right woman's position. This, too, would prevent the "nobler sex" being considered, as they are at present by many, less masculine in *their* natures by being put to do women's work. What valid objection can the female public entertain against employing their own sex in their own proper employments, and so adding to their independence; or what attractions have the men for them that they thus run after the man-milliners? Let an opposition-shop be tried, and the experiment may work well.

Gerando gives statistics of illegitimate births per 1,000 in countries with and in those without hospitals for foundlings.

| *States without Hospitals.* | Illegitimate Births per 1000. | *States with Hospitals.* | Illegitimate Births per 1000. |
|---|---|---|---|
| Prussia | 69 | France | 71 |
| England and Wales | 55 | Naples | 46 |
| Wales alone | 83 | Archduchy of Austria | 42 |
| Saxony | 121 | | |
| Hesse | 149 | | |

Terme and Montfalcon, Remacle, Guerry, Benoiston de Châteauneuf, etc., give many statistics regarding legitimacy in France, showing that in the beginning of the present century the illegitimates were to the legitimates as 1 in 20, at present as 1 in 14. The wars and conscriptions of the first years of the century would account for this disproportion. From 1824 to 1833, legitimate births in France were 9,031,908; illegitimate, 703,663; while the foundlings were 336,281. In 1847, the legitimate births are placed as 918,581; the illegitimate as 65,626; and the progressive increase of foundlings seems fairly attributable to increase of population.

That the mortality in foundling hospitals is great is unfortunately too true; and this has been brought forward as a strong argument against them. It is said that thus they fail in accomplishing the object in view, viz., the preservation of the lives of children. But this, I take it is not, and should not be the real object in view, which is the prevention of murder. The former object might and did influence the ancient lawgivers of Greece and Rome, with whom the benefit of the state was tantamount to all other considerations, but cannot, I presume, be acknowledged as the chief ruling motive by those who partake in the comity of present civilised nations. There is something harsh and discordant, if not horrible, in the expression of Malthus when he says, "An *occasional child-murder* from false shame, is saved at a very high price, if it can only be done by the sacrifice of some of the best and most useful feelings of the human heart in a great part of the nation." The state adopts and does all that can be done to preserve the

lives of the children, yet fails in that object, and the children gradually die; *but the state does not become their executioner.* It does its best under certain unfavourable circumstances, but cannot succeed in its praiseworthy intentions. And if we take all things into consideration, the poverty of the mothers of those exposed children, the neglect to which with such mothers they should be exposed, and the thousand difficulties under the circumstances in the way of rearing them, we must leave a very large margin for mortality in such cases during the first year. Thus we find it amounts in some of the very poor quarters of Paris to 32 per cent., and in the same sort of localities in London to 33·1 and 29 per cent. if we take Lambeth (1848) and Poplar respectively. In Leeds, the mortality is 30·6; and in Preston during the strike (1853-4), the mortality was 33·3 per cent. In some parts of Russia, the mortality is 31 per cent., and of an average of 27 throughout the empire.

Tables of the mortality of foundlings in different countries at the end of the last century have been given, from which it appears that under one year the deaths were at St. Petersburgh 40 per cent.; Florence, 40; Barcelona, 60; Paris, 80; Marseilles, 90. In France, in 1824, they were 57·6 per cent.

Amongst the causes of mortality in children, many are more or less preventible. That of carrying children from a distance, especially in severe weather, ranks as one of the first; and this is aggravated in some parts of the continent, where the messengers paid for their services are not over careful of their burden. Then the various diseases incident to all hospitals; epidemics of all kinds, imperfect ventilation where atmospheric purity is so absolutely necessary, and the disease of the cellular membrane peculiar to foundling institutions, play a great part.

But the most influential of all others is undoubtedly the deprivation of mother's milk and the many imperfect substitutes for it, from the badly adapted nurse, between whom and the infant no natural tie exists, to the often equally badly adapted food. At Parthenay and Poitiers, as shown by Gaillard, where the children are suckled, the mortality is much less than at X, where they are brought up by hand; and at Lyons, where for many years all are suckled, the mortality is much less than it formerly was and than in other places less favourably circumstanced in this respect. Unnecessary detention in hospital of those intended for removal is also much to be deprecated, as greatly tending to an increased mortality.

16, Norfolk Terrace, Bayswater, June 1858.

## REMARKS ON THE IMPORTANCE OF AVOIDING THE CONTAMINATION OF WATER WITH LEAD.

By JAMES BOWER HARRISON, M.D., F.R.C.S., Corresponding Member of the Epidemiological Society of London.

It is now many years ago since I first directed my attention to the subject of the contamination of water with lead. Some cases which occurred in my practice strongly impressed me with its importance. I could not but remark with interest the insidious nature of a poison which is ever present in our dwellings; the stealthy advances of the disease which it occasions; the fearful consequences which ensue; and above all, the happy manner in which the patient may be snatched from an impending and miserable death.

A subject of great antiquity and singular importance seemed to have fallen into comparative neglect; numerous writers had recorded with diligence, accuracy and even prolixity, the evil consequences which arose to artisans in the various occupations in which lead was employed. The maladies of plumbers and painters had been like household words. All the while the effects of lead on water were at once known and forgotten, the subject imperfectly understood and practically neglected. In 1803, Dr. Lambe, of Warwick, wrote a work entitled *Researches into the properties of Spring Water, with medical cautions against the use of Lead.* It was dedicated to Sir George Baker, and intended as a supplement to the able inquiries of that distinguished physician into the Devonshire colic. We must not measure the value of Dr. Lambe's work by the scientific accuracy of his conclusions. The merit of research does not rest with the last step of the inquiry. Dr. Lambe entered on the investigation rather as a medical philosopher than as a chemist; but because he *did* enter on the inquiry, he has done good service to the profession and to mankind. The inquiry may be said to have slept again after the treatise of Dr. Lambe. Perhaps his errors may, in some degree, have retarded the progress of truth. From time to time, individual inquirers recorded the deleterious effects of water impregnated with lead, but all the while lead was constantly being used, and its effects as constantly being produced. It is only now that we are awakened to the full importance of the subject. I have myself endeavoured to shed some light upon the inquiry, to press it upon the attention of others, and to collect together the scattered fragments of information which are to be found. Again and again I have been asked to witness, in my own practice, the effects of the lead-poison, and trace their slow and painful progress. Mr. Roberton, of Manchester, has lately directed my

attention to the results of his own experience, and urged me to continue an investigation which has so warmly interested me. I shall not go over again the details which I have already published,* I now only seek to collect into a focus the most interesting particulars which are elicited. It is the domestic evils which I have chiefly sought out, and it is to the domestic evils to which I would again refer. When first I resided in Broughton, the supply of water there was exceedingly defective; many families made use of soft water, collected in leaden cisterns, for every purpose for which water was required. Illness was a natural result, *lead colic* was frequent, and many persons left the neighbourhood with the full conviction that the air was insalubrious. In vain I pointed out the deleterious nature of the contaminated water; often my labours were ridiculed and my injunctions disobeyed. My striking success in the event of many cases sustained my interest on the subject. I looked always to discover the poison of lead when the symptoms pointed in that direction. I had considered these symptoms with careful deliberation, and found them identical with those which arise on the artificers of lead, and which have been so faithfully described by Desplanches. I noticed the sallow complexion of the skin, the constipation and griping of the bowels, the paralysis of the limbs, and the various other indications. Wherever these existed, I looked everywhere for lead, and abandoned the search only when every possible inquiry had been made. A thorough knowledge of the symptoms of lead disease seemed to me the foundation and very starting point of each investigation. If the symptoms existed, it was not sufficient to examine the water which might be supplied for analysis, or which the patient might desire his domestics to produce. It was necessary to find *the water* which had occasioned the complaint. I did not seek it, therefore, from the hands of the domestics and friends of patients. I took it from tea-kettles and water-bottles. In this way I prevented both error and deception, and arrived at once at a solution of the mystery. I have said that a knowledge of the symptoms of lead disease was the starting point of each inquiry. I may add that these symptoms—the true exponents of the evil—have not been properly understood. The language of disease has not been fairly interpreted, and its lineaments have remained unrecognized. It is thus that cases have been passed over which might easily have been understood and as easily remedied. It may *yet* be that the extent of the evil is unknown, that future inquirers may still have to discover its hidden ramifications.

* On the Contamination of Water with Lead. London: Churchill. 1852.

# PROGRESS OF EPIDEMICS.

## LOCAL REPORTS OF EPIDEMIC AND ENDEMIC DISEASES

*During the Months of March, April, and May*, 1858.

| Place. | County. | Lat. | Long. | Observer. |
|---|---|---|---|---|
| St.Mary, Scilly | Cornwall - | 49.50 N. | 6.24 W. | J. G. Moyle, Esq. |
| Teignmouth - | Devonshire - | 50.32 N. | 3.29 W. | W. C. Lake, Esq. |
| Portsmouth - | Hampshire - | 40.58 N. | 6. 6 W. | Alfred Jackson, M.D. |
| Odiham - - | Hampshire - | 51. 8 N. | 1. 3 W. | J. McIntyre, M.D. |
| Canterbury - | Kent - - | 51.17 N. | 1. 4 E. | G. Rigden, Esq. |
| Chatham - | Kent - - | 51.21 N. | 0.14 E. | F. J. Brown, M.D. |
| Wandsworth - | Surrey - - | 51.28 N. | 0. 7 W. | G. E. Nicholas, Esq. |
| Putney - - | Surrey - - | 51.28 N. | 0. 8 W. | R. H. Whiteman, Esq. |
| Up. Holloway | Middlesex - | 51.32 N. | 0.03 E. | W. B. Kesteven, Esq. |
| Swansea - | Glamorgansh. | 51.38 N. | 3.50 W. | W. H. Michael, Esq. |
| Colchester - | Essex - - | 51.54 N. | 0.52 E. | Henry Laver, Esq. |
| Aspley Guise - | Bedfordshire - | 52. 1 N. | 0.37 W. | J. Williams, M.D. |
| Saffron Walden | Essex - - | 52. 3 N. | 0.12 E. | T. Spurgin, Esq.<br>H. Stear, Esq. |
| Bedford - - | Bedfordshire - | 52. 8 N. | 0.51 W. | T. H. Barker, M.D. |
| Newpt.Pagnell | Buckinghams. | 52.10 N. | 0.42 W. | G. O. Rogers, Esq. |
| Sharnbrook - | Bedfordshire - | 52.12 N. | 0.40 W. | R. S. Stedman, Esq. |
| Wellingbro' - | Northamptons. | 52.20 N. | 0.40 W. | B. Dulley, Esq. |
| Beccles - - | Suffolk - - | 52.25 N. | 1.48 E. | W. E. Crowfoot, Esq. |
| Thetford - | Norfolk - - | 52.26 N. | 0.45 E. | H. W. Bailey, Esq. |
| Stourbridge - | Worcestersh. - | 52.28 N. | 2.32 W. | A. Freer, Esq. |
| Dudley - - | Staffordshire - | 52.30 N. | 2.10 W. | J. H. Houghton, Esq. |
| Barrowden - | Rutland - | 52.34 N. | 0.38 W. | H. J. Swann, Esq. |
| Wisbeach - | Cambridgesh. | 52.39 N. | 0. 5 E. | W. H. Hole, Esq. |
| East Dereham | Norfolk - - | 52.40 N. | 0.57 E. | J. Vincent, M.D. |
| Pontesbury - | Shropshire - | 52.43 N. | 2.50 W. | Wm. Eddowes, Esq. |
| Nottingham - | Nottinghamsh. | 52.50 N. | 1.10 W. | T. Robertson, M.D. |
| Burton-on-Trt. | Staffordshire - | 52.53 N. | 1.53 W. | S. Thomson, M.D. |
| Oswestry - | Shropshire - | 52.53 N. | 2.59 W. | P. Cartwright, Esq. |
| Wrexham - | Denbighshire - | 53. 2 N. | 3. 1 W. | E. Williams, M.D. |
| Hawarden - | Flintshire - | 53.11 N. | 3. 2 W. | T. Moffat, M.D. |
| Lincoln - | Lincolnshire - | 53.12 N. | 0. 5 W. | S. Lowe, Esq. |
| Alford - - | Lincolnshire - | 53.15 N. | 0. 6 E. | R. U. West, M.D. |
| Gainsborough | Lincolnshire - | 53.23 N. | 0.47 W. | D. Mackinder, M.D. |
| Liverpool - | Lancashire - | 53.24 N. | 2.59 W. | Thos. Bickerton, Esq. |
| Warrington - | Lancashire - | 53.25 N. | 2.32 W. | C. N. Spinks, Esq. |
| Wigan - - | Lancashire - | 53.32 N. | 2.33 W. | Jephtha Hussey, Esq. |
| Bolton - - | Lancashire - | 53.35 N. | 2.19 W. | W. H. Pendlebury, Esq. |
| York - - | Yorkshire - | 53.58 N. | 1. 3 W. | W. Procter, Esq. |
| Wst. Auckland | Durham - | 54.45 N. | 1.40 W. | G. Todd, Esq. |
| Rothbury - | Northumberld. | 55.25 N. | 1.50 W. | E. C. Summers, Esq. |
| Lerwick - | Shetland Isles | 60. 9 N. | 1. 8 W. | G. W. Spence, M.D. |

### QUARTERLY STATEMENT—No. XIV.

[*The dates denote that the disease appeared in the weeks then ending.*]

SCARLET FEVER.

Portsmouth—April 23
Canterbury—May 21-28
Chatham—May 21-28
Putney—Every week
Holloway—March 26, April 30
Swansea—Every week
Colchester—May 7-28
Aspley Guise—April 9-16, May 21-28
Bedford—May 7-21
Beccles—All Mar., April 2-9, all May
Stourbridge—Mar. 26, Apl. 2-9, May 7,
Dudley—Mar.5,19,Apl.9,23-30 [21-28
Barrowden—Mar. 12, 26, April 9, 23

Wisbeach—March 5-12
Nottingham—Mar. 5, April 30, May 7
Burton-on-Trent—Mar.12,Apl.30,May
Oswestry—April 2 [28
Wrexham—All March
Hawarden—March 5-12
Lincoln—April 23-30, all May
Gainsborough—Every week
Liverpool—Every week
Warrington—Every week
Wigan—March 26, April 16, May 7
Bolton-le-Moors—All Mar., April 23-30, all May
York—Mar. 26, Apl. 9-16, 30, May 7-21

MEASLES.

Portsmouth—Mar. 5-19, Apl. 2-9, May
Canterbury—Every week [4, 21
Chatham—Every week
Putney—March 19-26, April 30
Swansea—May 7-28
Colchester—Every week
Beccles—All March and April
Stourbridge—March 12-19
Barrowden—March 19-26, April 9
Nottingham—April 9-16
Wrexham—Every week
Liverpool—Every week
Warrington—May 7
Bolton-le-Moors—Mar.19-26, Apl. 2-9,
York—Mar.5-12,26, Apl. 9 [30,all May
West Auckland—Every week

SMALL-POX.

Portsmouth—March 12, May 14
Canterbury—All May
Chatham—April 9-30, all May
Swansea—Every week
Colchester—Mar. 19-26, all Apl. & May
Bedford—All March, April 2-9
Stourbridge—March 5, April 2-9
Dudley—March 19
Barrowden—Every week
Wisbeach—Every week
Pontesbury—April 16-30, May 7-21
Nottingham—March 26
Burton-on-Trent—March 12, Apl. 2-9
Oswestry—Every week
Lincoln—May 14-28
Liverpool—Every week
Warrington—All March and April
Wigan—Mar.5,19-26,Ap.16,30,all May
Bolton-le-Moors—All March, April 16-30, May 7-14
York—March 12, 26, April 2, 16, 30
Lerwick—May 21-28

HOOPING COUGH.

St. Mary's, Scilly—April 9-30, all May
Portsmouth—April 16, May 14
Canterbury—Every week
Chatham—May 7, 21-28
Wandsworth—April 16, 30, May 14
Holloway—March 5-12
Wanstead—April 2-16, May 7
Swansea—April 16-30, May 7
Colchester—Every week
Newport Pagnell—March 5-19
Beccles—April 16-23, May 14-28
Alford—Every week
Gainsborough—Every week
Liverpool—Every week
Warrington—All April and May
Wigan—March 19-26, April 16, 30
Bolton-le-Moors—All Mar.,Apl.2,9-16,
York—Apl.16-30,May 14-21 [May7-21

CROUP.

Teignmouth—April 9
Odiham—March 5-12
Canterbury—Mar.5, April 30, May 28
Chatham—Mar. 19, April 2-9, May 28
Wandsworth—March 12
Putney—March 5, April 30
Holloway—March 12, April 16
Swansea—March 5-12, April 23-30
Saffron Walden—April 16, May 28
Newport Pagnell—April 23, May 28
Beccles—March 5-12
Thetford—April 9, 23
Stourbridge—Mar. 26, Apl. 23-30, May
Dudley—March 12 [7-21
Wisbeach—March 5-19
Pontesbury—March 12, April 30
Burton-on-Trent—May 21
Lincoln—March 5-19
Alford—March 26, May 14
Liverpool—All Mar. & Apl., May 7, 28
Warrington—April 2
Wigan—April 16, May 21
Bolton-le-Moors—Mar. 19-26, April 2,
York—May 14-28 [23-30, May 14-28

CATARRH.

St. Mary's, Scilly—April 30, all May
Teignmouth—All Mar.&Apl., May7,21
Portsmouth—March 5-19
Odiham—All March
Chatham—Mar. 12-19, Apl. 16-30, May
Wandsworth—Every week [21-28
Putney—All March and April, May 7
Holloway—March 12
Swansea—Mar. 5, Apl. 16-30, all May
Colchester—All March and April
Aspley Guise—March 26, April 9
Saffron Walden—Mar.5-19,Apl. 2, May
Bedford—April 23-30 [7
Newport Pagnell—Mar. 5-19, Apl. 16-30, all May
Wellingborough—All Mar., April 2-16
Beccles—All March, May 7-21
Thetford—Every week
Stourbridge—April 9-16
Dudley—March 12, April 16
Barrowden—March 5, April 9

Wisbeach—All March, April 2-9
Pontesbury—March 12, May 21
Nottingham—All March
Oswestry—March 5
Wrexham—Mar. 12-26, April 2, 16-30
Alford—May 14
Gainsborough—Every week
Liverpool—Every week [May 7-14
Bolton-le-Moors—All March, Apl. 2-9,
Rothbury—Mar. 26, all April and May
Lerwick—Mar. 5-12, 26, April 16, 30, May 7-21

INFLUENZA.

St. Mary's, Scilly—All Mar., Apl. 2-16
Teignmouth—Mar. 5-19, Apl. 16, May
Odiham—April 9 [7-21
Chatham—Mar. 5, 26, Apl. 16, all May
Wandsworth—March 26
Wanstead—March 5-12
Saffron Walden—Mar. 12-26, Ap. 2, May
Newport Pagnell—Every week [21-28
Wellingborough—Every week
Beccles—May 21 28
Thetford—All Mar., Apl. 9 30, May 7-
Stourbridge—April 9-16 [14, 28
Pontesbury—March 5-19
Nottingham—March 5-19, May 21
Oswestry—April 30, all May
Wrexham—April 23-30, May 14-21
Lincoln—All March, April 2-16
Alford—March 12-26
Liverpool—Every week
Warrington—March 26, April 9
Bolton le-Moors—March 19-26, April 2, 23-30, May 7
Lerwick—March 12, April 16

ERYSIPELAS.

Portsmouth—April 30, May 14
Odiham—March 26
Canterbury—March 5, 19
Chatham—May 7, 28
Wandsworth—April 30, May 14
Putney—May 28
Wanstead—May 7
Swansea—March 5, all May
Saffron Walden—March 5, May 28
Newport Pagnell—Mar. 12-26, Apl. 2-23, May 28
Wellingborough—March 5-19
Thetford—March 12, April 2
Stourbridge—March 12, 26, April 2
Dudley—March 19, April 2-9
Barrowden—May 21
Wisbeach—March 26, April 2-9
Pontesbury—All Mar., Apl. 9-30, May
Nottingham—April 16 [7-21
Oswestry—March 5-12
Wrexham—March 26, April 2-9
Gainsborough—April 9-16
Liverpool—All Mar., Apl. 9, 23-30, May 7
Warrington—March 26, May 21
Bolton-le-Moors—March 12-26, April 16-30, May 7-14

CHOLERA (ENGLISH).

Stourbridge—April 2
Liverpool—March 5, April 30

AGUE.

Odiham—April 2-9
Canterbury—Mar. 12-19, all Apl., May
Chatham—Every week [21
Colchester—Every week
Saffron Walden—Mar. 12-19, April 2-9
Bedford—Every week
Newport Pagnell—April 30, all May
Thetford—Mar. 12, Apl. 9, 23-30, May 7-
Dudley—Mar. 12, Apl. 30 [14, 28
Barrowden—March 12-26, May 7-14
Wisbeach—Every week
Lincoln—Every week
Alford—April 9, 23, all May
Gainsborough—Mar. 12-19, Apl. 2-23
Liverpool—May 14
Warrington—April 23 30, May 7-14

REMITTENT FEVER.

Teignmouth—March 26, May 14-21
Odiham—April 30, May 14
Canterbury—Mar. 12, Apl. 23, May 7-14
Wandsworth—April 30
Putney—April 16, 30
Newport Pagnell—April 30, all May
Thetford—March 5, April 23, May 28
Stourbridge—March 19-26, May 7, 28
Wisbeach—All April, May 7
Oswestry—March 5-12, May 7-21
Alford—Every week
Liverpool—Every week
Warrington—April 9
Wigan—April 30, May 7-14
Bolton-le-Moors—March 19-26, April 2, 30, all May
York—April 9-16, 30, May 14
Rothbury—March 5-19, May 7-14

DIARRHŒA.

St. Mary's, Scilly—May 14-21
Portsmouth—April 23
Odiham—March 26, April 9, 23-30
Canterbury—May 14-28
Chatham—Mar. 12, April 2, 30, May 14
Wandsworth—All Mar., Apl. 9-30, May
Putney—All Mar., May 28 [21-28
Holloway—May 14
Swansea—Mar. 5-12, 26, Apl. 2-23, May
Colchester—May 14-28 [14-28
Aspley Guise—May 14-28
Saffron Walden—April 30, May 14
Bedford—May 21-28 [May 7
Newport Pagnell—Mar. 12-19, Apl. 30,
Wellingborough—April 30, all May
Beccles—April 16-30 [14, 28
Thetford—Mar. 5, 19-26, all Apl., May 7-

Stourbridge—March 12-19, April 16
Dudley—Every week
Barrowden—March 5, 26, April 9
Wisbeach—May 14-28
Pontesbury—All Mar., April 2-23, all
Nottingham—May 7-14 [May
Burton-on-Trent—April 9
Oswestry—Mar. 5-12, all April & May
Wrexham—March 26, April 2-16, May 14-28
Hawarden—Mar. 12,26, April 2-16, 30,
Liverpool—Every week [May 7-21
Warrington—May 14-28
Wigan—April 9, 23, May 7-14
Bolton-le-Moors—Mar.26,Apl.2,23,all
York—April 30, May 14-28 [May
Rothbury—Mar.12-19,Apl. 2-9, May 28
Lerwick—March 26, April 2-16

DYSENTERY.

Teignmouth—Mar. 26, April 9-16, 30,
Odiham—May 21 [May 14
Chatham—April 30
Wandsworth—Mar. 19, April 9, 23-30,
Saffron Walden—Mar. 5 [May 14-21
Newport Pagnell—April 16
Wellingborough—May 14-28
Dudley—March 12
Pontesbury—April 23-30
Wrexham—Mar. 26, Apl. 2-16, May 14-
Hawarden—March 19 [28
Alford—March 19-26, May 14-28
Gainsborough—Every week
Liverpool—All Mar.,Apl.16-30,all May
Warrington—All May
Wigan—April 16
Bolton-le-Moors—March 19-26, April 2, 16-23, all May
York—April 23, May 7, 21-28

TYPHUS.

Teignmouth—Mar.26, Apl.30, May 14-
Portsmouth—March 12 [21
Canterbury—March 26, April 2-16
Chatham—May 21
Wandsworth—Mar. 5, 19-26, all April,
Putney—All Apl., May 21 [May 7-21
Saffron Walden—April 2-16
Bedford—March 5, 19, April 16-30
Newport Pagnell—Mar. 12-26, all Apl.
Thetford—April 2-16, May 21
Stourbridge—April 16 23
Dudley—Every week
Wisbeach—April 30, all May
Wrexham—All March, April 2-16
Alford—Mar. 5-12, April 23-30, May 7
Liverpool—Every week
Wigan—March 26, April 9, 30
Bolton-le-Moors—March 26, April 2-16, 30, all May
West Auckland—All March and April
Rothbury—March 5-19

PUERPERAL FEVER.

Teignmouth—May 7
Canterbury—April 9
Chatham—May 21
Wandsworth—March 26
Beccles—March 5-12 [May 7-14
Bolton-le-Moors—Mar. 19-26, Apl. 30,

DIPHTHERITE.

Canterbury—All Mar., Apl. 23-30, all
Portsmouth—April 16 [May
Colchester—April 23-30, all May
Lincoln—May 21-28

CONTINUED FEVER.

Lerwick—April 23

TYPHOID FEVER.

Colchester—Every week

CARBUNCLE.

Portsmouth—April 9, May 7
Canterbury—Every week
Chatham—March 5
Wandsworth—March 5, May 7
Holloway—March 5-12
Wanstead—April 23, May 14
Swansea—March 5
Saffron Walden—March 19
Bedford—April 9
Wellingborough—May 14-28
Thetford—April 16, May 14
Stourbridge—April 30
Oswestry—May 14-21
Liverpool—March 19-26, April 2
Warrington—April 16 [May 7-14
Bolton-le-Moors—Mar. 26, Apl. 2-23,
West Auckland—April 23-30

MUMPS.

Lerwick—April 2

## ADDITIONAL OBSERVATIONS.

*St. Mary's, Scilly.*—Mr. Moyle writes: "The quarter ending May 28th has been characterised by the existence of three epidemics in these islands: influenza all March and the first nine days of April; hooping cough all April and May, and still continuing; varicella prevailing all May and still spreading. No death occurred from influenza; nor has any happened from

hooping cough, although some of the cases have been severe; their number has been 80. The varicella was ushered in in one case by convulsions; but the child recovered. In April and May severe cases of catarrh occurred, principally in those families where hooping cough was present. I can scarcely call this catarrh epidemic. There were twelve deaths during the quarter, viz:—

| No. | Cause of Death. | Sex. | Age. |
|---|---|---|---|
| 1. | Senile gangrene ..... | M. | 62 |
| 1. | Phthisis ..... | M. | 23 |
| 1. | Apoplexy ..... | F. | 66 |
| 1. | Softening of brain: diseased spine several years | F. | 28 |
| 1. | Infantile convulsions .... | | 6 mo. |
| 1. | Chronic bronchitis ..... | M. | 73 |
| 1. | Cancer of breast ..... | F. | 67 |
| 1. | Pneumonia ..... | F. | 71 |
| 1. | Paralysis ..... | F. | 78 |
| 1. | Chronic dysentery ..... | M. | 69 |
| 1. | Debility from age ..... | M. | 88 |
| 1. | Valvular disease of heart | F. | 59 |

"The weather during the whole quarter has been fine and dry, 7·65 inches of rain only having fallen during the three months; we had *twenty-two* fine days in March. The average of ozone was one for March; three for April; and five for May. The prevailing winds in March were east; in April, west; May was on the whole stormy, with the winds from the north-west. There was no epidemic among the cattle, and the crops look well; the early potatoes have turned out well—a good average crop."

*Teignmouth.*—Mr. Lake writes: "The coldest part of the winter was the time intervening between February 25 and March 5; the temperature then rose suddenly and considerably, but its daily range was unusually great all through March. The temperature was very variable during the first half of April, and on the whole low; it then rose till the 20th of the month, declined from that date till May 3d; rose gradually, but to no great extent, through that month, and increased somewhat suddenly towards its close. The barometric pressure was low in the early part of March, high in the middle of the month, and from that time variable till the end of the quarter. The degree of humidity for March was about the average for April alone; for May, below the average. During the first week in March snow fell. 7·137 inches of rain were measured as having fallen during the quarter. Of these 0·393 of rain and melted snow fell between March 2 and 14; 3·851 from March 30 to April 10; 0·769 between April 24 and May 4; 1·984 from May 12th to 24th. The wind during the quarter blew principally from an easterly direction, except from March 6th to the 16th, when it blew from north or north-west for a few days in April and during the middle of May, when it was westerly or south-westerly. A good deal of ozone existed in

the first half of March, little in the latter half. It was developed in considerable quantity during the first part of April, then only moderately and variably till May 8th, from which date till the end of the month it again was freely developed. Diseases affecting the respiratory organs (excluding influenza) had largely predominated over those affecting the digestive system during the last quarter; during the quarter now ended the numbers of each class were pretty equal. Influenza showed itself mostly during the commencement and the close of the quarter. The following appeared, in the cases that came under my notice, the most remarkable features of disease during the quarter:—The prevalence of dysentery, ordinarily commencing with diarrhœa, as a result of exposure to cold and wet, apparently of the nature of a catarrh of the large bowels, and usually yielding readily to Dover's powder and fomentation: the not unfrequent occurrence of cases of urethral and vesical, and also of uterine irritation, the result of cold, and of a rheumatic or catarrhal character; the uterine affection being amenable without much difficulty to Dover's powder and fomentation; the vesical or urethral affection being sometimes equally amenable to the same treatment, but often much more obstinate in its character: a tendency of the febrile attacks of children to run into active abdominal inflammation; and an unusual tendency to the occurrence of delirium of an aggravated character in febrile and inflammatory affections."

*Canterbury.*—Mr. Rigden writes: "During the last three months several cases of diphtheria have presented themselves. Many were of a very severe character, and five proved fatal; viz., two in March and three in April. The disease has been mostly confined to children and young persons under twenty-five years of age. Measles has been very prevalent, and four cases have proved fatal; viz., three in April and one in May. A few cases of smallpox have been seen, three of which have fallen under my observation; they were all in one family; the disease supposed to have been introduced from Deal, a town about eighteen miles from here. The first two cases were in a servant and infant, attacked within two days of each other. The servant had been vaccinated, and had the variola in a modified form. The infant, aged seven weeks, not vaccinated, had the disease in a confluent form, and died on the tenth day. The mother of the infant was afterwards attacked; she had been vaccinated in infancy, and had the variola in a modified form. All the other inmates of the house had been vaccinated, and escaped the contagion. Hooping-cough has been very general, particularly among the poorer classes. Ague and

intermittent forms of disease have been more frequent than they were a few years since. Furunculoid diseases have been common. From a population of 18,398 inhabitants, there were 58 deaths registered in March, 43 in April, and 39 in May. Of these numbers, 24 died from zymotic diseases."

*Chatham.*—Dr. Brown says: "Measles have prevailed to a greater extent during the last three months than has been known for many years. The disease has proved fatal in several instances. One of the sequelæ noticed in this epidemic has been erythema nodosum with scanty renal secretion. Iron, with saline medicines, and especially change of air, proved efficacious. Ague in various forms continues; one child, aged eight years, died of it in May. He had head symptoms. The case was registered "Ague," 17 days; "Cephalitis," 14 days. Phlegmasia dolens occurred in the week ending April 30th, and metria (of adynamic type) in the week ending May 21st. There have been many cases of stomatitis and a few of diphtheria during the three months. Diphtheria has not appeared in a fatal form. The small number of cases of continued fever is worthy of note. There were many cases of febricula (synocha)."

*Wandsworth.*—Mr. Nicholas says: "During the quarter just ended, as in that preceding it, the most prevalent diseases were those of the respiratory organs, which with diarrhœa, dysentery and continued fever, prevailed during the whole period. In 327 cases of pauper sickness coming under treatment, the following were the relative proportions of these diseases:—Continued fever formed one-sixteenth; diarrhœa and dysentery, one-twelfth; while diseases of the respiratory apparatus constituted one-fourth of the whole. There has been an almost entire absence of the exanthemata."

*Putney.*—Mr. Whiteman writes: "There has scarcely been known a period during which scarlatina has been either so prevalent or so persistent in the district as in the past quarter. Very few families have entirely escaped the epidemic, but the malady has been happily of a mild type, resulting in death in but two instances only. A severe case of diphtheritis, fatal in a few hours, was treated in a child at the early part of the quarter. The throat affection and the effusion of coagulable lymph were preceded by a slight patchy eruption, somewhat resembling that of scarlatina, but differing in many respects from the ordinary appearances of the true exanthem. A rather severe form of diarrhœa prevailed in March, and two or three cases of fever of a typhoid character were treated during the

following month. Catarrh and bronchitis prevailed extensively during the easterly winds of March and April."

*Swansea.*—Mr. Michael writes: "This quarter has been marked by the prevalence of epidemic disease. Smallpox has been especially very prevalent chiefly among the children of the very poorest inhabitants living in the most densely populated portions of the town. But no place has been free from its visitations; the breezy hill side, with its tidy cottage or commodious farm house, has been as prone to its visits as the most dirty squalid abode of poverty in a back court. Scarlatina has been generally very mild; in few cases fatal or complicated. Measles has lately commenced, but the cases I have seen have not been severe. In one case the eruption of measles was displaced by smallpox the day after the appearance of the first disease."

*Colchester.*—Mr. Laver writes: "The cases of smallpox were the most important this quarter; they occurred principally as isolated cases, and have not been very fatal. Typhoid fever, although occurring during the whole quarter, has not been very general. Diphtheria has occasionally appeared, and in my own practice has been fatal in two out of three cases. Vegetation has appeared healthy."

*Bedford.*—Dr. Barker writes: "Ague has been present in this district throughout the quarter, although the cases have not been numerous."

*Thetford.*—Mr. Bailey sends the following quarterly report:—"March.—This month may be considered peculiar from the extreme fluctuation of the atmospheric pressure, the range being 1·6; the maximum being on the 22nd, and the lowest on the 6th, when we experienced a considerable gale of wind. The amount of rain during the month was ·67 of an inch; and the mean of the dew point 36, being 8° below the mean of temperature. At the commencement of the month the temperature was low, only on one day reaching as high as 40°, and the nights were very severe; on the grass it was as low as 18°, and three feet from the ground, 20°. On the 13th, a sudden increase of temperature took place beyond temperate; it rose to the maximum degree of 63 on the 24th, and the lowest during the day was 26°, making a range of 37°. This sudden vicissitude gave rise to numerous cases of catarrh and influenza among all grades of society. Pneumonic and pleuritic affections were more than usually prevalent, as were also rheumatic fever and ague. Diarrhœa was also epidemic, in some cases being very severe, producing the greatest prostration. One case of fever, commencing with diarrhœa, occurred;

it might be called enteric typhus, running a course of three weeks, leaving anasarcous swellings and excessive debility. The winds being most prevalent from the N. and N.E. in the early part of the month, and from the imprudent exposure of children, numerous cases of bronchitis came under notice. Many cases terminated fatally; the disease also attacked adults. Shingles attacked two children in different families; they were under three years of age, and ultimately did well. One case of phthisis pulmonalis terminated fatally in a female who was predisposed to the disease; her death might have been accelerated by the sudden change of temperature. A fatal case of enlargement of the liver, with ascites, occurred in a female of very abstemious habits, who had been under no medical treatment until the last week, and not even confined to bed until two days before death. The casual diseases of the month under notice were—abortion, psora, impetigo, hæmorrhoids, procidentia uteri, paralysis, hysteria, hypertrophy of the heart, and hydrocele. The diseases of cattle were more numerous than usual; they were—sore throat, enteritis, pleuropneumonia, colic, and rheumatism. With cows, many fatal cases occurred in their calving. The sheep were very healthy; and the fall of lambs was abundant, with very few losses. Vegetation was extremely backward, and the later frosts destroyed fruits which were more forward.

"April.—The barometrical range of this month was less fluctuating, the range being 1·2; but the temperature in its range was more singular for this month, deviating considerably during the first fortnight, and afterwards assuming a summer temperature. The maximum was on the 16th at 72°, the minimum on the 13th at 35°; the range being 37°. The dew point was 44°. The diseases arising from the sudden changes of temperature were chiefly influenza, quinsy, and among children, congestions of the pulmonary organs. These were most prevalent during the early part of the month. On the sudden transition of temperature, diarrhœa became more prevalent, attacking the rich as well as the poor. Ague and typhoid fever attacked the working-classes, and especially those who were deprived of the common necessaries of life. Rheumatism frequently came under treatment, and pleurodynia was more frequent than I had observed for some months. One fatal case of croup took place this month, in a child about ten months old; it was evidently occasioned by exposure to the severe cold and frosty nights. With the exception of influenza, catarrh, and diarrhœa, we had no specific epidemic, so that the month may be considered as having been more

healthy. The casual diseases of the month, and under treatment, were hæmoptysis, ascites, jaundice, asthma, convulsions, fistula *in ano*, gout, and furunculus. Upon inquiry of the veterinary-surgeon, I learned the diseases among cattle were not so numerous; the most prevalent were sore throats, colics, and obstructions of the bowels. The foliage was very backward.

"May.—This month came in with a very low atmospheric pressure, and a temperature barely temperate, with the nights very cold and frosty. The range of the barometer was 1·4; the fall of rain 1·35 inch. The greatest fall of rain took place on the day and night of the 24th, amounting to ·67 of an inch. With the exception of the first week, the temperature of the month exceeded that of last May. On the 31st, the temperature rose to 81°; it has not been so high the last seven years. The range during the month was 46°. Although the month was very variable, we had but few diseases under notice. No epidemic occurred. The most prevalent complaints were catarrhal affections, influenza, and bronchitis. Several cases of ague occurred in the labouring classes, arising more from working in wet clothes and imprudence than from any other cause. Only two cases of remittent fever came under notice during the month. Diarrhœa was more prevalent; and one case terminated in typhoid fever. The casual diseases which came under treatment in the month were—hepatitis, delirium tremens, ascites, neuroses, colonitis, phthisis pulmonalis, phlegmonous inflammation of the leg, dyspepsia, tic douloureux, amenorrhœa, and furunculus. The cattle were very healthy for the month.

*Record of Deaths in Twenty-one Parishes* (*population* 9,574) *from the Registrar's Book.*

| *March.* | | *April.* | | *May.* | |
|---|---|---|---|---|---|
| Typhus | 1 | Erysipelas | 1 | Diarrhœa | 1 |
| Bronchitis | 1 | Consumption | 1 | Consumption | 3 |
| Hepatitis | 1 | Bronchitis | 3 | Bronchitis | 2 |
| Tetanus | 1 | Croup | 1 | Disease of heart | 1 |
| Rupture of bladder | 1 | Quinsy | 2 | Convulsions | 1 |
| Dropsy | 1 | Cerebritis | 1 | Hydrocephalus | 1 |
| Debility | 2 | Dropsy | 1 | Cerebritis | 1 |
| Decay of nature | 8 | Debility | 5 | Diseased liver | 1 |
| | | Decay of nature | 2 | Dropsy | 2 |
| | | | | Debility | 1 |
| | | | | Decay of nature | 8 |
| | 16 | | 17 | | 22 |

*Dudley.*—Mr. Houghton writes: "The deaths in Dudley in the last quarter were 287. The average of the last ten corresponding quarters was 254. Hence, the mortality is 33 above

the average ; 56 deaths arose from zymotic diseases, being 1 on 5-125 of the whole. This is less then the average of zymotic deaths ; 7 deaths were caused by fever, 4 by scarlet fever, 1 by measles, 2 by small-pox, 11 by croup, 1 by erysipelas, 13 by diarrhœa, 17 by infantile convulsions. Only four of the cases of croup were certified ; and I feel little doubt that a number of the non-certified cases of croup were, in fact, diphtheria. The most remarkable feature, however, in the health of Dudley lately, has been what I may almost call an epidemic of uterine hæmorrhage. Within the last six weeks, in four practices in Dudley, no fewer than 22 cases of serious uterine hæmorrhage have occurred, and 4 of these have proved fatal, 11 alarming, and 7 serious. In one case the placenta was presenting, actively in 7, partially in 8. The flooding was *post partum ;* in 2 it was accidental, and in 3 connected with abortions. The particulars of the other case are not known to me, except that it was severe. Other cases have no doubt occurred in the other five practices in Dudley, of which I know nothing. But the occurrence of 22 cases of hæmorrhage, in Dudley, in less than half the practices of the town, is a remarkable and alarming fact, and one which I am totally at a loss to account for."

*Barrowden.* — Mr. Swann says : "The district upon the whole has been more healthy this quarter. I have had several cases of ague in the neighbouring villages. At Ketton, a large village, four miles east of Barrowden, small-pox has been raging with unabated fury. Nine deaths have occurred ; and as far as I can hear, none of the patients had been vaccinated. Numbers have had it who had been vaccinated, and several have the disease now, but I hear of no deaths. Scarlet fever, too, has been fatal in several cases, at the same place ; I have had a few cases of measles in my district."

*Burton-on-Trent.*—Dr. Thomson states : "That the quarter, in his district, has been marked by the absence of the commoner epidemic diseases. Dropping cases of scarlet fever and of small-pox have occurred in the villages, but not with sufficient frequency to be called epidemic."

*Lincoln.*—Mr. Lowe writes : "We have had a large number of cases of ague during the whole of this quarter. Diphtheria has been prevalent the last two or three weeks. We have been unusually free from typhus fever."

*Gainsborough.*—Dr. Mackinder writes : "The epidemics have left us, and our town no longer suffers by a comparison with the districts reputed healthy. Indeed, we have had reason to congratulate ourselves, as far as fatal diseases are concerned,

for several years past. The recent visitation of throat affection has been severe, if the number of people who have suffered from it be the only index; for scarcely an individual has escaped; but the mortality therefrom has been infinitesimally small. Out of about four hundred cases for which I have prescribed in my own practice, there has been but one death, in an infant who was quickly asphyxiated by the membranous exudation. The toxic condition of the atmosphere generating diphtheria seems as yet to have existed in a few localities only, and with varying degrees of attenuation. With us the poison has been diffused in moderate doses, the disease having been generally mild, but often very persistent. Since my last report, I have observed many cases of diphtheria, which were accompanied, as previously stated, by a rash, identical with scarlatina, yet unlike that disease in the period of its departure, the eruption in some cases having reappeared daily for two, three, or four weeks. These certainly may have been cases of diphtheria engrafted on and modifying the character of scarlatina; but they have not been like those genuine cases of scarlatina which seem to participate in the epidemic and exhibit the characteristic fibrinous exudation in the throat, without manifesting any change in the cuticular efflorescence. In many of the cases that I attended, both with and without the rash, the fauces were simply congested and rubeolated; in others there was a stratum of inspissated mucus; while a third series showed the deposition of a most tenacious and membranoid material. Ulceration of the mouth was frequently coexistent, but scarcely any of the cases assumed the aspect of the common ulcerated throat. In many instances the tendency to bleed was so great, that the surgeon, except under the most urgent circumstances, would not have been justified in using the knife. To the last the epidemic maintained its adynamic type. Close on the heels of diphtheria came scarlatina, of which we have had many cases of the mildest form, and chiefly among the children in the workhouse. In all these convalescence was rapid. Diarrhœa and dysentery have been far from infrequent among children, many of whom also suffered from bronchitis and hooping-cough. Rheumatism and ague have been more than usually prevalent; of the latter, all the cases but one that came under my care were introduced. We have had two cases of lockjaw; one in a middle aged, respectable man of robust constitution, after an incised wound through the nail of his left thumb. The wound went on well; but on the ninth day after the receipt of the injury, he felt a stiffness in the jaw, and six days afterwards he died, notwithstanding

the lobelian saturation of a notorious and ominous charlatan.* The other patient was a little boy seven years old, of hereditary predisposition; his maternal grandfather and two of his maternal uncles having died of traumatic tetanus. The exciting cause in this case was an abraded chilblain, and though the muscles of the jaw, spine and flexors of the toes were in a state of tonic spasm for several weeks, he got quite well. 173 paupers were attended as fresh cases in the quarter —71 in March, 62 in April, and 40 in May. Of these 16 were between 60 and 70 years old; 20 between 70 and 80 years old; 9 between 80 and 90 years old; and one, who recovered from an attack of diarrhœa, had arrived at the good old age of 92. Mr. Chapman, V. S., informs me that throat affection has been common among horses in this neighbourhood since the beginning of May, and though generally amenable to treatment, some few cases have been lost from supervenient pleurisy. The pathological condition in all, as observed at the necropsy, was, besides the effusion into the pleural cavity and the pulmo-costal adhesions, either a thick coating of tenacious mucus or an absolute lining with false membrane of the tonsils, fauces, trachea, and larger bronchial ramifications. The amount of deposit in some cases was so great as to induce croupy respiration, and in one instance life had to be sustained for many days by enemata of milk. Mr. Chapman gave a bottle and a half of wine daily to one horse, and believes the disease to be decidedly adynamic. Where ill-informed men have been allowed to blood the horses, death has been the result. Parotitis has been a frequent accompaniment. The prevailing disease among cattle has been influenza. Pleuro-pneumonia is now uncommon, and the cases that do occur are curable. Fine weather prevailed throughout the month of March. Snow fell to the depth of three or four inches in the first week, and a few showers from the 12th to the 14th. The first week in April was showery, and from the 24th to the end; the remainder of the month remarkably fine. The whole of May was showery. Rain fell on seventeen days out of twenty-six. The total amount of rain which fell in March was 1·21 inch; in April, 1·66; in May, 2·44 inches. Very little *ozone* was exhibited in March, but it was developed freely from the

* Like its sister county, Rutland, with the "Old woman of Wing", Lincolnshire is proverbial for its quackery, its bone-setters, its cobbler-Coffinites, its Skeltonites, its dotage-stricken herbalists, its wind pills, its Godfrey's cordial, its diascordium, and its other soporific poisonous nostrums, with which lazy, thoughtless, and unfeeling mammas stupify, stultify, and nullify their neglected and truly wretched children.

| Treatment commenced. | Diseases of Private Patients. | Diseases of Pauper Patients. | Barometric pressure at the temp. of 32° Fahr. | Temperat. Dry bulb. | Temperat. Wet bulb. | Direction of Wind. | Rain in 24 hours. | Ozone. (Schoen.) | Remarks. |
|---|---|---|---|---|---|---|---|---|---|
| Feb. 26 | Pleurodynia, stomatitis ulc., tonsillitis | Anasarca | 30·268 | 36 | 32 | E. NE. | ·0 | 2 | Clear |
| 27 | Faucitis, urticaria | Conjunctivitis | 30·092 | 33 | 31 | NE. | .01 | 4 | Overcast |
| 28 | „ parotitis | | 29·873 | 36 | 35 | NE. | ·0 | 10 | 2 in. snow |
| Mar. 1 | „ dysentery, catarrh | Rheumatism | 29·778 | 30 | 30 | N. | ·0 | 10 | Snowshower |
| 2 | „ cong. of brain, dysen., diarr. | Dyspepsia, bronchitis | 29·891 | 33 | 32 | NE. | ·0 | — | „ |
| 3 | Diarr., canc. uteri, hoop. cough, dysp. | Gingivitis | 29·887 | 34 | 32 | NE. | ·0 | — | |
| 4 | „ epilepsia | Hooping cough, dysentery, colic | 29·898 | 30 | 29 | NE. | ·07 | 2 | |
| 5 | Dysentery | Catarrh, bronchitis, frostbite§ | 29·682 | 36 | 34 | N. | ·07 | 5 | |
| 6 | Diph.* with erysip., scarlatina, anæmia | „ diarrhœa, rheumatism | 29·028 | 34 | 29 | N. | ·0 | — | Boisterous |
| 7 | Lockjaw | „ „ | 29·167 | 35 | 32 | NW. SW. | ·15 | 2 | 2 in. snow |
| 8 | Faucitis, dysentery, cardialgia, colic | „ | 29·200 | 28 | 27 | NW. | ·0 | — | Clear |
| 9 | „ with tonsillitis, pneum., dysen. | Bronchitis | 29·457 | 34 | 33 | NW. | ·0 | 2 | „ |
| 10 | Diphtherite, bronchitis, tertian ague† | Anasarca | 29·731 | 37 | 32 | NW. | ·0 | — | „ |
| 11 | Dysentery | Catarrh, rheumatism | 29·908 | 28 | 26 | N. | ·0 | — | „ |
| 12 | „ diphtherite, faucitis, stomatitis | Pleurodynia, neuralgia, menorrhagia, | 30·151 | 33 | 32 | NW. | ·10 | 6 | „ |
| 13 | | Diarrhœa [bronchitis | 29·288 | 45 | 43 | SW. | ·03 | 2 | Variable |
| 14 | Faucitis | Colic | 29·543 | 47 | 42 | W. | ·14 | — | „ |
| 15 | „ with tonsillitis and rash, dysen., stomatitis ulcerosa | Faucitis, vertigo, diarrhœa, frostbite | 29·811 | 46 | 43 | W. | ·0 | 2 | „ |
| 16 | Lumbago, bronchitis, dysen., anæmia, convulsions from dentition | Paralysis, bronchitis | 29·926 | 48 | 45 | NW. | ·0 | — | „ |
| 17 | Tonsillitis | Rheumatism | 30·158 | 45 | 42 | W. | ·02 | — | Clear |
| 18 | Quotidian ague, diarrhœa, bronchitis | Scarlatina | 30·123 | 50 | 48 | W. | ·0 | — | „ |
| 19 | Faucitis, pleurodynia, conjunctivitis, tertian ague‡ | | 30·237 | 49 | 46 | W. | ·0 | 7 | Overcast |
| 20 | Bronchitis, hooping cough, anasarca | | 30·367 | 49 | 46 | S. | ·0 | — | „ |
| 21 | Dysentery, oxaluria | | 30·522 | 51 | 47 | S. | ·0 | — | Clear |
| 22 | Faucitis, stomatitis, diarrhœa | Hæmorrhoids, scarlatina‖ | 30·571 | 44 | 42 | N. | ·0 | — | „ |
| 23 | „ „ scarlatina, scabies | | 30·519 | 47 | 45 | S. | ·0 | — | „ |
| 24 | Diphtheria, diarrhœa, rheumatism | Scarlatina, diarr., leucorr., colic, anasarc. | 30·197 | 51 | 47 | W. | ·0 | 7 | „ |
| 25 | „ faucitis, tonsillitis, scarlat., dysen. | „ pustular ophthalmia | 30·250 | 43 | 39 | N. | ·0 | — | „ |
| 26 | „ diarrhœa, conjunctivitis, dysen., ecthyma, epilepsy | | 30·220 | 40 | 37 | N. | ·0 | — | „ |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 27 | Faucitis, bronchitis, colic | Eczema, lichen, rheumatism, diarrhœa | 30·175 | 43 | 40 | NW. | ·0 | 3 | „ |
| 28 | Scarlatina, urticaria, dysentery | Phthisis | 30·114 | 54 | 49 | SE. | ·0 | — | „ |
| 29 | Faucitis | Scarlatina, dysen., lepra, icterus, oph- | 29·995 | 50 | 46 | SW. | ·0 | 6 | „ |
| 30 | „ diarr., dysen., epilepsy, bursitis | Dysentery [thalmia | 29·663 | 52 | 47 | S. | ·0 | 10 | Scud |
| 31 | „ „ pleurodynia, rheumatism | Eczema, diarrhœa | 29·263 | 54 | 50 | SW. | ·63 | 10 | „ |
| Apl. 1 | „ | Tertian ague¶ | 29·293 | 39 | 38 | N. | ·0 | — | Showery |
| 2 | „ cardialgia [meningitis spinalis | Faucitis, scarlatina, bronchitis | 29·454 | 47 | 46 | SE. | ·13 | — | „ |
| 3 | Diphth., monomania, catarrh, pleuritis, | Hæmorrhoids | 30·003 | 42 | 39 | NW. | ·15 | 3 | „ variable |
| 4 | Faucitis, hoop.cough, bronchitis, dysen. | Faucitis | 30·110 | 44 | 40 | E. | ·0 | 10 | „ |
| 5 | „ diphtheritis, scarlatina, myopia | Scarlatina, catarrh, conjunctivitis | 29·911 | 42 | 38 | E. | ·0 | 4 | „ |
| 6 | „ bronchitis, diarrhœa | Tertian ague, diarr., impetigo, bronchit. | 29·873 | 38 | 36 | SE. | ·82 | 10 | „ [&snow |
| 7 | „ stomatitis, dysentery, dysuria | Faucitis, scarlatina, bronchitis, pust. | 29·632 | 35 | 35 | SE. | ·10 | 10 | Storm of rain |
| 8 | „ bronchi., urticaria, erysip., pneum. | „ [ophthalmia | 29·875 | 40 | 35 | E. | ·0 | 5 | Snow shower |
| 9 | „ hoop.cough, suppressio mensium | „ furuncle | 29·942 | 40 | 36 | N. | ·0 | — | Fine till 18th |
| 10 | „ periostitis, diarr., hydrothorax | Scarlatina, frostbite | 29·901 | 44 | 40 | N. | ·0 | — | |
| 11 | Apoplexy, paralysis | | 29·943 | 37 | 32 | NW. | ·0 | — | |
| 12 | Erysipelas, pleuritis, catarrh, pleurodynia, convulsions from dentition | Colic, scarlatina, struma | 29·979 | 38 | 32 | NW. | ·0 | 5 | |
| 13 | Diphth., erysip., faucitis, diarr., dysen. | Tertian ague, dysuria | — | — | — | — | ·0 | — | |
| 14 | Faucitis, bronchitis, hooping cough, rheumatism, colic | Faucitis, diarrhœa | 30·114 | 41 | 38 | SE. | ·01 | — | |
| 15 | Diphtheritis, scarlatina, bronchitis, meningitis spinalis | Valvular disease of heart | 29·939 | 54 | 48 | S. | ·0 | — | |
| 16 | Faucitis, epistaxis, leucorr., monomania | Rheumatism | 29·921 | 54 | 51 | SW. | ·30 | 6 | |
| 17 | " hoop.cough, catarrh, diarr., leucor. | Faucitis, scarlatina | 29·992 | 47 | 46 | N. | ·0 | 2 | |
| 18 | Dysuria, menorr., bronchit., paralysis | | 30·202 | 59 | 54 | SE. | ·0 | 8 | Clear till the |
| 19 | Diphth., paronychia, conv. from teeth. | Anasarca, pleurodynia | 30·125 | 54 | 47 | S. | ·0 | — | 24th, and va- |
| 20 | Rheumatism, prostatis, hydrocephalus, hooping cough | Dysuria, bronchitis, carcinoma of stomach | 30·075 | 53 | 48 | NW. | ·0 | — | riable to end of month |
| 21 | Faucitis, colic, dyspepsia, hoop. cough | Leucorrhœa, dyspepsia, amenorrhœa | 30·208 | 58 | 50 | NW. | ·0 | — | |
| 22 | „ diphtheria, bronchi., diarr., syphilis | Erythema, scarlatina, anasarca | 30·349 | 61 | 55 | W. | ·0 | 5 | |
| 23 | „ | Gingivitis | 30·321 | 60 | 54 | SE. | ·0 | — | |
| 24 | Faucitis, dysentery | | 29·961 | 59 | 52 | SE. W. | ·05 | — | |
| 25 | Dysentery [mesent. | | 29·955 | 55 | 51 | SE. | ·0 | 6 | |
| 26 | „ gravel, congestion of brain | Diarrhœa, sclerotitis, scarlatina, tabes | 30·096 | 47 | 45 | N. S. | ·0 | 10 | |

* As in my former report, I have confined the term diphtheria to the case in which a deposit of lymph took place. † Ague imported.
‡ The ague patient came from the fenny district a few weeks before. ♀ All the cases of frostbite occurred to children in the workhouse.
‖ Several cases of scarlatina occurred in the workhouse, all of the mildest form. ¶ Ague imported from Heckington Fen.

| Treatment commenced. | Diseases of Private Patients. | Diseases of Pauper Patients. | Barometric pressure at the temp. of 32° Fahr. | Temperat. Dry bulb. | Temperat. Wet bulb. | Direction of Wind. | Rain in 24 hours. | Ozone. (Schoen.) | Remarks. |
|---|---|---|---|---|---|---|---|---|---|
| Apl.27 | Diphtheria | | 30·060 | 44 | 43 | N. | ·0 | 10 | |
| 28 | Hæmorrhoids, bronchitis, jaundice | | 30·011 | 56 | 52 | S. | ·0 | 2 | |
| 29 | Vaginitis | Lumbago, nephritis, paralysis | 29·597 | 49 | 47 | S. | ·08 | 6 | |
| 30 | Hemiplegia, diarrhœa | | 29·063 | 49 | 46 | SW. | ·02 | 4 | |
| May 1 | Rheumatism | Scarlatina* | 29·008 | 46 | 43 | S. N. | ·55 | 3 | The weather |
| 2 | Dyspepsia, diarrhœa, leucorrhœa | | 29·328 | 48 | 45 | N. | ·24 | — | was variable |
| 3 | Diarrhœa | " hooping cough | 29·457 | 49 | 44 | N. W. | ·05 | 6 | throughout |
| 4 | Menorrhagia, diarrhœa, laryngitis | | 29·793 | 46 | 43 | N. S. | ·0 | — | this month. |
| 5 | | Constipation, dysentery | 29·882 | 55 | 50 | SW. N. | ·0 | 7 | Rain fell on |
| 6 | Aphtha, neuralgia | Impetigo, febricula, bronchitis | 30·312 | 50 | 45 | N. E. | ·0 | 3 | seventeen |
| 7 | Faucitis, catarrh | | 30·401 | 50 | 45 | E. | ·0 | — | days out of |
| 8 | Bronchitis | Bronchitis | 30·354 | 55 | 50 | NE. | ·15 | 10 | twenty-four. |
| 9 | Diarrhœa | Tonsillitis | 30·191 | 50 | 48 | NE. | ·01 | 3 | |
| 10 | Faucitis | | 30·184 | 53 | 47 | NE. | ·0 | 10 | |
| 11 | Dropsy | Catarrh, diarrhœa | 30·094 | 50 | 45 | NE. | ·0 | 5 | |
| 12 | Melæna | | 29·835 | 49 | 46 | NW. | ·06 | — | |
| 13 | Chlorosis, Faucitis | Bronchitis | 29·679 | 47 | 45 | NW. | ·14 | — | |
| 14 | Pleurodynia | | 29·672 | 51 | 49 | SW. | ·04 | 10 | |
| 15 | Diarrhœa, pustular ophthalmia | Cellulitis, impetigo | 29·415 | 59 | 53 | SW. | ·38 | 10 | |
| 16 | | | 29·477 | 63 | 56 | SW. | ·08 | 10 | |
| 17 | Faucitis, sciatica, rheumat., meningitis | Catarrh | 29·789 | 57 | 54 | SW. | ·0 | 10 | |
| 18 | Vaginitis, bronchitis, dysentery | Valvular disease of heart | 29·745 | 60 | 56 | SW. | ·01 | 2 | |
| 19 | Rheumatism, faucitis | | — | 57 | 49 | SW. W. | ·0 | — | |
| 20 | Pneumonia | | 29·045 | 60 | 52 | NW. S. | ·01 | 7 | |
| 21 | Epilepsia | | 29·854 | 61 | 56 | S. | ·05 | 5 | |
| 22 | Faucitis, hoop. cough, hæmorrhoids | | 29·714 | 62 | 54 | SW. | ·06 | 10 | Thunder |
| 23 | | | 29·644 | 63 | 56 | SW. | ·09 | 6 | storm |
| 24 | Catarrh | Impetigo | 29·779 | 35 | 48 | SW. | ·47 | 8 | |
| 25 | Bronchitis, hoop. cough, diarr., hysteria | Scarlatina | 29·862 | 48 | 47 | NW. | ·05 | 8 | |
| 26 | | | 30·395 | 54 | 47 | N. S. | ·0 | — | |
| 27 | Icterus | Paralysis | 30·101 | 59 | 55 | SW. | ·0 | — | |
| 28 | Tonsillitis | Phthisis, epithelioma, colic | 30·065 | 57 | 51 | NW. | ·0 | — | |

* Three cases of scarlatina in one house in the town.

3d to the 8th of April, from the 16th to the 18th, and from the 24th to the end of the month, and also throughout the month of May. The spring was early. The first swallow was seen on the 10th of April; the cuckoo first heard on the 24th; and the lilac first seen in flower on the 6th of May. The oak was in leaf in the middle of May, and the ash not till the end of the month. The cereal crops and the meadows promise an abundant produce." A table of the diseases and meteorology of Gainsborough for three months, is given at pages 200-2.

*Liverpool.*—During the quarter ending April, 3,700 deaths were registered in the borough, including 216 sudden and violent deaths and deaths in hospitals not included in the weekly reports. This exceeds by 362 the corrected average of the same quarter of the preceding ten years. Diseases of the zymotic class were fatal in 993 cases during the quarter, being 250 more than the corrected average. The deaths from scarlatina, hooping cough, typhus, and diarrhœa, show a decrease; those from measles and small-pox are increased as compared with the previous quarter. Scarlatina declined from 369 to 254, hooping cough from 191 to 130, typhus from 173 to 151, diarrhœa from 134 to 43, while measles were from 20 to 156, and small-pox from 54 to 123; croup caused 40 deaths, erysipelas 20, syphilis 20, diphtheria 7, chicken pox 5, mumps 1. From diseases of the lungs the deaths were 1,228, being about the corrected average; of these, 411 were from consumption. Of the 123 who died from small-pox, 38 are said to have been vaccinated.

*Warrington.*—Mr. Spinks writes: "Scarlatina has been very prevalent during the last three months, and still continues so. The great majority of the cases were very mild. Small-pox was prevalent in March and April; it raged more amongst the adults of both sexes than the children. I have seen patients from forty to sixty years of age; no deaths occurred in my district. Ague, as usual, appeared in April and May, in those Irish labourers who were in the fens of Lincolnshire last harvest. It seems that the miasma of ague lies dormant in those patients all winter, when they are not in employment. I have observed for some years, that so soon as those men get actively employed in the spring, they are certain to have an attack of this disease."

*Wigan.*—Mr. Hussey says: "If I were to judge of the value of sanitary improvements from the amount and character of disease this quarter, I should be much inclined to think we were considerably behind our needs in this respect. Smallpox has visited us a second time within a short period, and as if it

| Deaths. Week ending | March. 6th. | 13th. | 20th. | 27th. | April. 3rd. | 10th. | 17th. | 24th. | May. 1st. | 8th. | 15th. | 22nd. | 29th. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Scarlet fever | 15 | 17 | 18 | 15 | 16 | 16 | .. | 16 | 17 | 14 | 16 | 16 | .. |
| Measles | 13 | 16 | 9 | 7 | 8 | 9 | .. | 13 | 22 | 8 | 24 | 13 | .. |
| Small-pox | 8 | 9 | 11 | 10 | 10 | 9 | .. | 6 | 4 | 10 | 11 | 6 | .. |
| Hooping cough | 6 | 11 | 11 | 9 | 9 | 5 | .. | 8 | 5 | 10 | 8 | 8 | .. |
| Croup | 2 | 2 | .. | .. | 4 | 4 | .. | .. | .. | .. | .. | .. | .. |
| Influenza | .. | .. | .. | .. | .. | .. | .. | .. | 1 | 3 | .. | .. | .. |
| Erysipelas | .. | .. | 4 | 4 | .. | 4 | .. | .. | .. | .. | .. | .. | .. |
| Cholera | 1 | .. | .. | .. | .. | .. | .. | .. | 1 | .. | .. | .. | .. |
| Ague | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 1 | .. | .. |
| Diarrhœa | 1 | 1 | .. | .. | 3 | 6 | .. | .. | 1 | 7 | 4 | 6 | .. |
| Typhus | 5 | 16 | 20 | 18 | 10 | 12 | .. | 14 | 13 | 10 | 10 | 14 | .. |
| Carbuncle | .. | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Intemperance | .. | .. | .. | 1 | .. | .. | .. | .. | .. | 2 | .. | .. | .. |
| Diseases of lungs | 99 | 116 | 94 | 83 | 106 | 93 | .. | 89 | 60 | 87 | 77 | 87 | .. |
| Syphilis | 3 | 1 | .. | .. | 3 | 2 | .. | .. | 3 | 3 | 1 | .. | .. |
| Diphtheria | .. | .. | .. | .. | .. | .. | .. | .. | 2 | 2 | .. | 2 | .. |
| Mumps | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Quinsy | .. | .. | .. | 1 | 1 | .. | .. | .. | .. | .. | .. | .. | .. |
| Total deaths during each week | 248 | 284 | 273 | 245 | 271 | 258 | .. | .. | 200 | 242 | 243 | 260 | .. |
| Corresponding week, 1857 | 221 | 193 | 222 | 236 | 235 | 204 | 195 | 285 | 194 | 241 | 236 | 192 | 206 |

METEOROLOGICAL OBSERVATIONS.

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Barometer: Mean | 29·76 | 29·69 | 30·11 | .. | 29·62 | 29·88 | 30·01 | 30·22 | 29·73 | 30·05 | .. | 29·77 | .. |
| Dew-point temperature | 27·8 | 32·2 | 43·0 | .. | 42·6 | 33·9 | 37·9 | 43·7 | 43·7 | 42·5 | .. | 47·1 | .. |
| Thermometer: Highest (mean) | 39·5 | 41·5 | 50·2 | .. | 53·6 | 46·7 | 51·9 | 61·8 | 56·2 | 54·8 | .. | 61·3 | .. |
| Lowest (mean) | 32·1 | 32·3 | 42·1 | .. | 42·0 | 36·6 | 39·0 | 46·4 | 44·9 | 43·8 | .. | 50·5 | .. |
| Mean | 35·8 | 36·9 | 46·2 | .. | 47·8 | 41·7 | 45·5 | 54·1 | 50·6 | 49·3 | .. | 55·8 | .. |
| Mean of 12 years | 43·3 | 43·0 | 44·1 | .. | 45·5 | 47·3 | 47·9 | 49·2 | 48·3 | 50·1 | .. | 55·2 | .. |
| Range | 7·4 | 9·2 | 8·1 | .. | 11·6 | 10.2 | 12·8 | 15·5 | 11·3 | 11·0 | .. | 10·8 | .. |
| Mean range, 12 years | 8·1 | 8·3 | 8·9 | .. | 10.1 | 9·3 | 10·9 | 11·7 | 11·2 | 12·4 | .. | 11·6 | .. |
| Rain fell on days | 2 | 7 | 5 | .. | 5 | 3 | 3 | 1 | 4 | 2 | .. | 4 | .. |
| Rain fell during hours | 3·3 | 17·0 | 3·7 | .. | 26 9 | 32·5 | 23·2 | 2·5 | 8·6 | 2·8 | .. | 4·0 | .. |
| Amount of rain in inches | 0·23 | 0·79 | 0·12 | .. | 0·77 | 1·04 | 0·51 | 0·21 | 0·42 | 0·07 | .. | 0·41 | .. |
| General direction of wind | NE. | NW. | WNW. | .. | SSE. | ESE. | SSE. | var. | var. | NNW. | .. | var. | .. |

had not had sufficient time to prolong its stay when first it came, it has this time made up for it. There have been a great number of cases in Hindley, with a population of eight thousand, but the mortality is scarcely one per cent. in those previously vaccinated. Vaccination carefully performed, and due regard paid to selection of lymph, with re-vaccination every five years, would in my opinion rid us in time of a loathsome disease. I have very good reason for saying, that the quality of lymph used and sent out is highly objectionable in some instances. The country never looked better than at present, and with the approach of summer, disease is not so prevalent as it was a few months past."

*Bolton-le-Moors.*—Mr. Pendlebury writes: "The past quarter has not been remarkable for any particular epidemic, or excess of sickness of any kind, which may be accounted for by the absence of sudden alternations of temperature, and the general fineness of the weather. Scarlet fever has not prevailed generally, but in special localities has been rather rife. Smallpox in a similar way, has been rather more prevalent in some parts. During the earlier part of the quarter, carbuncles and boils prevailed rather extensively. Vegetation has progressed very favourably, and there is every prospect of an abundant and luxuriant harvest."

*York.*—Mr. Procter writes: "The past quarter has been by no means unhealthy, and the amount of disease which has shown itself has been small. During the latter part, there has been scarlet fever, hooping cough, and remittent fever, to some extent. Smallpox is greatly on the decline, but numerous cases of chickenpox have shown themselves."

*West Auckland.*—Mr. Todd says: "During the last quarter measles and continued fever have prevailed; the former pretty generally, the latter but partially and sporadically. Three cases of continued fever have proved fatal in one family,—viz.; three sons, of the respective ages of ten, twelve, and nineteen. The house is situated in a marshy and filthy village, and its interior anything but clean. The cases were characterized by intestinal complication at first, and in two of the cases, this was succeeded by severe cerebral complication; the third died from thoracic complication. The origin of this fever could not be traced to anything like contagion; the patients had not been near any one in fever, nor did the disease prevail in the place where they lived. The brother-in-law of those individuals who resided about a mile from their residence, visited them several times during their illness, and took the fever. At first, in this case, there were sickness and vomiting, diarrhœa, and acute tenderness

over the abdomen ; in about a week those symptoms subsided, and the brain became affected, and he died on the fourteenth day from the commencement of his illness, with low muttering delirium, subsultus tendinum, retention of urine, and obstinately constipated bowels. No cutaneous rash of any description was observable in any of those cases. This last case adds another proof to the many, which I have observed, of continued fever originating from paludal, miasmatic, or local causes, becoming contagious. It is of the utmost importance, that the error of the Cullenian doctrine should be pointed out and refuted by facts, since it has, in my opinion, been the very groundwork of that altercation which has so long and so very bitterly prevailed upon this subject. The writers on both sides have endeavoured to support the doctrine of Cullen, and have been equally impressed with the truth of his erroneous definition of continued fever, only warring with each other in support of Cullen's distinction, and hence those who from personal observation have been compelled to acknowledge the origin of continued fever from paludal sources have yet felt themselves compelled, at the same time, to deny that a fever having such an origin can become contagious, and thus they have been driven to split continued fever into a great many artificial and laboured divisions ; indeed, their principal aim appears to me to have been to avoid simplicity ; like Hudibras of old, they appear to be able to divide a hair twixt south and south-west side. The cases of measles have not been characterized by any particular complication, with the exception of slight bronchial affection. During the spring and summer months, we generally see the disease in its pure and uncomplicated form."

*Lerwick.*—Dr. Spence writes : "During the first fortnight of March there were very heavy snow storms, and the snow lay on the ground till near the end of the month. After a week of fine weather, snow fell again in the beginning of April, but did not lie long. The remainder of April and the whole of May were very variable, with much fog, frequent rain, and a greater prevalence of northerly wind than is usual at the season. Vegetation has been very backward. The average development of Ozone was, in March, 6·8 ; in April, 6·2 ; and in May, 6·3. By an error in the last quarterly statement (No. XIII.), I am made to say that typhus occurred in several weeks in December, January, and February, whereas it should have been dysentery. There was very little disease of the epidemic class during the quarter. The total number of deaths was 20, and the average age was 39, there being 1 below 5

and 4 above 70. But of these, 7 were violent deaths. One was a case of drowning; 1 was occasioned by a fall between a boat and a wharf, by which rupture of some of the abdominal viscera (probably the liver or spleen) was produced, and collapse speedily ensued; while 5 of the deaths were the result of an awful tragedy, in which a man, apparently labouring under a sudden fit of impulsive insanity, murdered his wife and three of their children, and then committed suicide. If these be subtracted from the total deaths, the number will be 13, which is less than during the same quarter last year; and the average age at death will be 46, which is rather high. The causes of the remaining deaths where medical certificates were granted were—small-pox, 1; acute bronchitis, 1; valvular disease of the heart, 1; general dropsy, 2; congestion of brain, 1; chronic inflammation of brain, 1; hydrocephalus, 1; chronic hepatitis and subacute gastritis, 1; obstruction of bowels, 1; ovarian tumour, 1. The first case of small-pox was imported from Liverpool, and terminated fatally five hours after the man was landed. The disease has since spread rapidly."

## SANITARY LEGISLATION.

*Bills.*—A Bill to Amend the Public Health Act, 1848, and to make further Provision for the Local Government of Towns and Populous Districts, has been prepared by Mr. Adderley and Mr. Secretary Walpole, and has given rise to much discussion in the Legislature. This Bill proposes to incorporate the previous Act of 1848. It gives to Local Boards powers in relation to sewerage, cleansing, and regulation of buildings; and contains many useful clauses tending to simplify sanitary legislation.

Three Medical Reform Bills have been brought forward during the last quarter; and one, prepared and brought in by Mr. Cowper, has passed into committee. Mr. Cowper deserves great credit for the desire he has shown to introduce by law a more catholic feeling amongst the members of the medical profession. For this reason, we would support his measure. The fact is, however, that the only reform required in medicine is self-reformation. There is, in truth, not a single proposition in Mr. Cowper's Bill, either in relation to reciprocity of practice, the promotion of sound medical education, or registration of qualified practitioners, which might not be carried out fully by the profession itself, without any new legislation whatever.

Our cotemporary, the *Medical Times*, suggests the institution of a "Royal Commission of Inquiry." We would suggest the institution of a conference of all the medical, examining, and governing representatives, for the discussion of the whole question of the medical and sanitary requirements of the day. At such a conference, an uniform system of education and examination might be agreed upon, a form of register arranged, —if such an addition to the present *Medical Directory* be required; and a plan adopted for defining the special privileges of different members of the profession. For, after all, the honour of the medical body can only be sustained by the principles of honour present in each individual member; while these will be much more favourably supported by spontaneous action than by any legislative enactment.

*Reports and Returns.*—A "Return", relating to the expenses of the Board of Health, gives the following account:

*Return of Salaries paid or payable to the Officers of the present Board of Health for* 1857.

| | £ | s. | d. |
|---|---|---|---|
| The President (to 24th Sept. 1857, when, under the General Board of Health Continuance Act, 1857, the Vice-President of the Committee of Council on Education was appointed President without salary) | 1,450 | 7 | 4 |
| Private Secretary to President (to 24th September 1857) | 104 | 15 | 7 |
| Medical Officer of the Board | 1,500 | 0 | 0 |
| Secretary | 1,000 | 0 | 0 |
| Assistant Secretary | 600 | 0 | 0 |
| Chief Superintending Inspector | 1,000 | 0 | 0 |
| Two Inspectors (£800 each) | 1,600 | 0 | 0 |
| Surveyor and Draughtsman | 250 | 0 | 0 |
| Four Clerks | 835 | 11 | 11 |
| Office-keeper | 100 | 0 | 0 |
| Three Messengers | 220 | 0 | 0 |
| Housekeeper | 20 | 0 | 0 |
| | £8,680 | 14 | 10 |

The Annual Report of the "National Vaccine Board," shows that the metropolis, during the last year, has been very free from smallpox; and adds the following table, which will interest the statist:

*Deaths from Small-Pox registered in London during Ten Years* 1848-1857 *inclusive.*

| | 1848. | 1849. | 1850. | 1851. | 1852. | 1853. | 1854. | 1855. | 1856. | 1857. |
|---|---|---|---|---|---|---|---|---|---|---|
| 1st quarter . | 388 | 228 | 95 | 275 | 389 | 62 | 123 | 323 | 194 | 60 |
| 2nd „ .. | 381 | 113 | 103 | 209 | 472 | 53 | 122 | 328 | 146 | 27 |
| 3rd „ .. | 435 | 78 | 109 | 243 | 231 | 42 | 142 | 196 | 108 | 41 |
| 4th „ .. | 413 | 99 | 191 | 339 | 74 | 60 | 289 | 177 | 74 | 26 |

The report again expresses the importance of securing pure lymph for vaccination, and a careful performance of the operation.

THE

# SANITARY REVIEW.

OCTOBER 1858.

## THE DEATH-RATE OF ENGLAND.*

"Pallida mors æquo pulsat pede pauperum tabernas
Regumque turres."

So sang the poet Horace, in the Augustan age of Rome; and it is only of late years that the world has begun to question the truth of a sentence which held for centuries a conspicuous place in its proverbial philosophy. Mankind has so long acquiesced in the great truth that all men are mortal, that the majority have thought it unnecessary to inquire whether all men are equally so. Whilst philosophers and political economists have found in the various questions relating to the increase of the species an ample and attractive field of investigation; whilst physicians have directed their inquiries to the nature and treatment of isolated disease, or at most have been compelled to a wider survey by the ravages of some far spreading epidemic, the great problems constantly worked out around them in the actual death-rate of the people have hitherto met with few observers; their facts have been allowed to pass unchallenged; and, in place of careful deduction, has been advanced little but groundless assumption or vague surmise.

Yet, if we allow ourselves to reflect on the information conveyed by a numerical statement of mortality in the various districts of a country of known population, provided such statement be deduced from the observation of a sufficiently extended period, it will not be long ere we become aware of its vast importance as a subject of inquiry. The rate of death in a district is not a mere statistical formula; it is the most delicate index of the physical well being of its inhabitants; it represents the commercial value, in the widest sense, of its men, women, and children; its revelations are not simply of the actual loss of human life, but of the waste of human intellect

* An Inquiry into the different Proportions of Death produced by certain Diseases in different Districts in England. By Edward Headlam Greenhow, M.D. With an Introductory Report on the Preventibility of Certain Kinds of Premature Death. By John Simon, F.R.S. Blue Book. London: 1858.

and human strength produced by morbific influences, only a small portion of which can be fatal; and, if it teaches with certainty of the present, it prophesies with equal certainty of the future. Whilst, on the one hand, all allow that national intellect and national wealth, the social advancement and political power of a people, are in direct relation with well developed brains and vigorous muscles, with stalwart arms and brawny shoulders, with healthy lungs and good stomachs; on the other, it is indisputable that a high death-rate indicates an unhealthy population, and that such a population must of necessity procreate an enfeebled offspring, a race incapable of high aims and great deeds. An undue national mortality can only be the precursor of political decay and national fall. The death-rate of England is the true pulse of the nation, the slightest increase of which from the normal standard imperatively demands the attention of all "statists and lovers of their country."

These remarks, which we acknowledge are somewhat trite, have been forcibly suggested by the perusal of the paper by Dr. Headlam Greenhow, published under the authority of the General Board of Health, which embodies the results of his *Inquiry into the Different Proportions of Death produced by Certain Diseases in Different Districts in England;* together with the Introductory Report by Mr. Simon, *On the Preventability of Certain Kinds of Premature Death.* To some of the facts and deductions at which these gentlemen have arrived, we would now invite the attention of our readers, premising that we do not think it easy to overestimate the value of Dr. Greenhow's labours, whether considered as a statement of truth, eliminated and worked out with much care and precision, or as pioneering the way to a most important and hitherto neglected field of scientific observation.

To identify the diseases which cause the surplus mortality in unhealthy districts, and to inquire what are the local and special morbific influences at work, originating or intensifying such dominant diseases, are the objects of Dr. Greenhow's labour. In the preparation of a course of lectures on Public Health, he found himself at a loss for materials in the shape of anything like exact information on these points. The principal sanitary literature of the day had dealt more in generalisations, frequently made from insufficient data, than in accurate deductions from ascertained facts. Because in many urban populations the mortality is far in excess of that which obtains in rural districts, it was hastily inferred that the great cause of preventable death throughout the country, was that neglect of well known sanitary laws which is especially incident to

crowded communities. The prominence and magnitude of the evils accompanying or dependent on the compression of population within a limited area, overshadowed and obscured other causes of death and decay, which not less certainly, though less obtrusively, shed their fatal influences on the destinies of the people. Accordingly, with but few exceptions, our current teaching on public hygiene might be summed up under the three heads—ventilation, domestic and urban cleansing, and water-supply; and to enforce or improve these are the remedies which have been empirically recommended in all cases of more than average mortality. We would not for a moment be supposed to underrate the vast importance, as well as pressing necessity, of urging these matters on the national attention; we shall hereafter illustrate the considerable part their neglect plays in the causation of disease; but that reformation in these particulars is far from representing all that must be done ere England stands foremost in health and happiness, as she does in wealth and science, the facts which we shall submit to our readers will abundantly prove.

Again, there has prevailed hitherto considerable ignorance, at least in non-professional circles, as to the exact maladies which unnecessarily swell our death-roll. That the people are carried off by fever, cholera, and the other diseases usually included in the class zymotic, and that their agency is to a great extent controllable, most well informed persons are aware; but beyond this their knowledge does not extend. In fact, as Dr. Greenhow observes, the appellations zymotic and preventable are often used as convertible terms. To how many will the information be new, that pulmonary affections, including phthisis, cause nearly a quarter of our annual mortality; that phthisis alone kills every year more than fifty thousand persons; and that, of all our non-contagious diseases, it and its allied forms of death are most under the control of the living!

In the prosecution of his undertaking, Dr. Greenhow selected from the six hundred and twenty-three districts into which England and Wales are divided for the purposes of registration, a series of one hundred and five, comprising "a variety of healthy and unhealthy places, each of them distinguished by its position, character, or some peculiarity in the industrial employment of its inhabitants." The diseases whose influence he determined to estimate were, besides those of the zymotic class, those which arise from perverted or imperfect nutrition, including tubercular affections, together with disorders of the respiratory organs, convulsions, teething, apoplexy, paralysis,

rheumatism, carbuncle, and phlegmon. A period of seven years, 1848-54, is the time over which his investigation extends; a duration which he believes to be sufficiently long to obviate any miscalculation from the accidental fluctuations of particular seasons. The occurrence of the Census in 1851 determined the selection of this particular series of years, the returns of population then made being employed as the divisors for calculating their death-rates. The following is the mode by which he arrived at his results:—

"The number of deaths occasioned in each district during the septennial period by each of the several diseases having been added together separately for each sex, the annual average death-rate of each sex from each disease has been carefully calculated, the population of 1851 being employed as the divisor. In order to afford a correct comparison between the several districts, it was necessary to bring the death-rates to one common denomination. To avoid the use of fractions, the death-rates have been calculated in each district for 100,000 persons; for, although it is true that very few districts contain 100,000 persons of each sex, and the entire population of most districts falls far short of 100,000, there is no real objection to the adoption of any standard for a comparison of the present kind, provided only the correct proportions be preserved."

The averages of mortality thus obtained have been compared with the death-loss from the same diseases in England and Wales taken as a whole, with that of each of the great registration provinces into which the country is divided, and with that of particular counties. Information is also appended, in the tables which form the groundwork of the paper, as to the number of inhabitants in each district; the average number of persons residing on each square mile; the number of persons in each hundred of the entire population, who dwell in towns; the number of paupers to each thousand inhabitants; together with the names of the most prevalent industrial occupations.

Supplemental to the major investigation which is above sketched out, twenty of the selected districts have been made the basis of a minute inquiry, which throws considerable light on the influence of age in determining the fatality of particular diseases. In each district have been computed "the average annual proportion of deaths per 100,000 children of each sex, below the age of five years, from all causes, and from each of the several diseases, phthisis, diarrhœa, and diseases of the respiratory organs"; "the average annual proportion of deaths from phthisis and from diseases of the respiratory organs, in adults above twenty years of age, per 100,000 of each sex"; and "the average annual proportion of deaths from typhus, in young persons under twenty years of age, and in adults above twenty years of age, per 100,000 of each sex."

Such being the character and scope of the work before us, before detailing any of the results at which the author has arrived, we may refer to a question which naturally suggests itself on the threshold of any such investigation; it is, What is the ratio of non-preventable death; in what proportion must the population of this country necessarily, year by year, succumb to the common fate of humanity?

This question has received special attention from the Medical Officer of the Board of Health, in his *Introductory Report;* and from his conclusions we shall draw our reply. Death from old age, from a physiological point of view the only natural mode of death, would, it may be believed, take place in most individuals about the age of eighty. In this sense, any death occurring before that period must be regarded as premature. Did all thus live out the full measure of their days, the annual mortality would amount to 1250 in every 100,000. But all premature death is not preventable. There are causes which nip infancy in its bud, and destroy manhood with "its blushing honours thick upon it", over which science, in its present state of advancement, exercises but a limited control. Such are congenital conditions and hereditary tendencies, the current contagions of hooping-cough, measles, and scarlatina, poverty and its concomitant evils, accidental injuries, criminal violence, and the long train of maladies which follow in the steps of vice and intemperance. Some of these are in the nature of things inevitable, others will only admit of mitigation to a partial extent, and by degrees; but to the question, What is the necessary augmentation of mortality resulting from the operation of these causes in the present state of society? at least an approximate answer is to be found in the varying death-rates of different districts.

In the ever restless and ever mingling population of such a country as England, where the intermixture of families is restrained by no class restrictions, where the facilities of human intercourse are greater than in any other, it cannot be affirmed that these causes are likely to have more than a temporary preponderance in one locality than another. Now in sixty-four districts, containing a million of inhabitants, the annual average mortality does not exceed from 1500 to 1700 in the 100,000; in other words, from 250 to 450 in excess of what it would be did the population reach the extreme verge of human existence. In assigning this as the highest range to which the death-rate from non-preventable causes should rise, we may rest assured we are not fixing too low a standard. Although it may be urged that many of these districts are rural, and therefore to a

certain extent more removed from some of the fatal influences we have mentioned, yet, on the other hand, such immunity can be but temporary, and it must be counterbalanced by the large proportion which, in consequence of the constant migration of youth and adult life to the towns, infancy and old age preserve in our rustic populations. Wherever, then, the mortality exceeds the above ratio, the just conclusion is, that it depends on causes which are local, and, if local, certainly preventable ; at least, the science of the nineteenth century would indignantly repel the charge of being powerless to their removal. Now the deplorable truth is that, in nine-tenths of the kingdom, the death-rate is in excess of the highest limit we have stated, viz. 1700 in the 100,000 ; the average of deaths for the whole country being 2,266, whilst in some districts it reaches the enormous amounts of 3,100, 3,300, and 3,600. By this calculation, then, we are inevitably led to the conclusion arrived at by the Registrar-General, that one out of every four persons who annually die in England falls a victim to the neglect of physiological laws ; or, in other words, that 100,000 are each year cut off by causes of artificial production.

In endeavouring to elucidate the origin of this waste of human life, the natural mode of proceeding would appear to be to inquire what is the actual death-loss from diseases which are known to be more or less dependent on alterable causes ; to observe in what localities these diseases exercise their fullest influence, and what are the peculiarities in the condition, occupation, or mode of living of the inhabitants, which raise them to such an unenviable preeminence. That cholera, dysentery, and diarrhœa, typhus and typhoid fevers, diseases of the respiratory organs, phthisis, and other strumous affections, the contagious diseases of childhood, and the nervous affections of infancy, are to be included in this category, is established on irrefragable evidence, a summary of which is to be found in Mr. Simon's *Report.* The total mortality from these diseases amounts to 227,000 per annum ; the relative is as follows : the three diarrhœal diseases have, during the last eight or nine years, destroyed an annual average of 26,388 ; fevers, including typhus, typhoid, infantile, and remittent, 18,616 ; non-tubercular diseases of the respiratory organs, 50,273, of these deaths 23,020 have occurred during the period of childhood ; tubercular disease, including phthisis, numbers its 57,982 victims ; deaths by the infectious disorders, including small-pox, amount to 36,587 ; and 37,000 children are yearly swept away by those affections of the nervous system which find their chief development where infancy is " cribbed, cabined,

and confined" in close rooms and ill ventilated wards, and in those centres of manufacturing industry, where, amid the din of the factory, the voice of maternal instinct is lost, and hecatombs of young lives are sacrificed to the necessities of the many and the emolument of the few.

Descending to particulars, and following the plan of the work before us, we shall treat these affections *seriatim;* and, commencing with the pulmonary class, which in Dr. Greenhow's arrangement is made to include phthisis, the first fact which attracts our notice is, that the inhabitants of agricultural districts enjoy a marked immunity from these diseases. The annual average mortality from all pulmonary affections is, in England and Wales, 569 for the male population, 535 for the female, in the 100,000. In two of the eleven great divisions of the kingdom, the pulmonary death-rate is greatly in excess; these are London and the north-western counties, the divisions which possess the largest urban population. In London the male death-rate is 758, and the female 593; in the north-western counties, the male 694, and the female 674. On the other hand, in purely agricultural districts, where there are no towns and the inhabitants are tillers of the soil, the annual average loss from these diseases varies from 216 (in Glendale) to 473 (New Forest) for each 100,000 of both sexes. Again, it is the large towns which exhibit the most excessive loss. Liverpool, the unhealthiest town in the kingdom, loses for every 100,000 of each sex 1062 males, and 939 females; Bristol, 979 males, and 742 females; and Manchester, 905 males, and 816 females. But we must pause ere we infer that the collection of human beings in urban communities is *necessarily* accompanied by so high a development of diseases of the breathing apparatus. There are many towns in England where pulmonary disease is under the general average. In Norwich, with a population exceeding that of Bristol (proper), the death-rate from this class of malady is 536; in Bedford, Bideford, Wellingborough, Knaresborough, Spalding, Whittlesey, Lewes, and Wisbeach, the death-rate is under 500 for both sexes; Whittlesey and Knaresborough are, in this respect, both healthier than the New Forest. Neither does a greater aggregation of the inhabitants within a given space necessarily give rise to an increase of this class of death. "The population density of Bristol", says Dr. Greenhow, "being considered as 100, that of Hull would be 77; of Gravesend, 30; and of Ipswich, only 11. Thus Hull has seven of its inhabitants crowded on the same space of ground that is occupied by a single individual in Ipswich. Yet Hull contrasts favourably with Ipswich as

regards the proportion of deaths from pulmonary affections among its inhabitants; for Ipswich annually loses at the rate of 97 persons per 100,000 more from this class of diseases than Hull." In fact, the proportion in Hull is only three in excess of that of the entire kingdom. The conclusion we would draw is, that, although it cannot be denied that a certain predisposition to lung and bronchial disease is induced by urban residence, yet, on the other hand, the amount of such influence is *per se* comparatively limited; that it must be strengthened and enforced by other causes, ere it can suffice to poison the well-springs of life; and that, were such other sources of danger removed or lessened, the death-roll of our towns would never exhibit the disgraceful and deplorable results to which we have alluded.

To return, however, to the country; we should again err did we imagine that mere living apart from "tower'd cities and the busy hum of men", is in itself a passport to safety from pulmonary disease. It is in country districts, perhaps, that the full influence of occupation on the inhabitants is best recognised. Even purely agricultural pursuits are not equally healthful. A curious illustration of this seems furnished by the district of Hendon. The male death-rate from disease of the respiratory organs in Hendon is not only high in itself, but much higher than the female. The explanation offered is, that Hendon includes the great hay-growing district which lies between London and Harrow. Most of its agricultural labourers are employed as hay-binders or carters, and are thus constantly exposed to the inhalation of an irritating dust. Whether this be a correct explanation of the facts we cannot say, but at least it appears a curious coincidence. In a certain number of rural populations, the men are cultivators of the soil, whilst the women are engaged in various in-door manufactures. Of this the districts of Newport Pagnell, Bedford, Towcester, and Wycombe may be taken as examples. They are all lace-making districts; and in all of them the female mortality from lung affection is very considerably in advance of the male. The same rule prevails, although to a less extent, and liable to one or two exceptions, in localities where the women are employed in the manufacture of cotton, straw plait, and straw bonnets. How direct is the sequence between the occupation of lace making and the development of phthisis, is shewn most clearly by an examination of the death-rate of Towcester. In this district, the "excess of the death-rate from pulmonary affections" (principally phthisis) "in the adult women above the death-rate of men, is very nearly twice as high as the excess

for the whole of life. Moreover, children perish in an undue proportion during the first years of life, both from all causes, and from affections of the chest; but the death-rate of male children from all causes, and from pulmonary diseases, is higher than the death-rate of female children by what must be considered as the normal amount."

Nowhere is the effect of occupation on health more clearly demonstrated than in the mining districts of England. In the pure bracing northern air of the romantic Cumberland uplands, in the mining districts of Wales, and on the rocky Cornish moors, where the soft western breeze is first met, wafted from the broad Atlantic—wheresoever the same industrial pursuit prevails, the same results are encountered. For several reasons, the calculations from which the fact of the injurious effect of metal-mining on the respiratory organs is deduced, are particularly free from sources of fallacy. Metalliferous mines are situated in most instances far away from the busy towns, in the midst of a rustic population unaffected by urban influences, and the people attracted to their vicinity are the comparatively small number who earn in them their sustenance, or minister to the wants of their workers. Few of the weaker sex are employed in them; in the whole of England, the class of women miners does not exceed in number eleven thousand The sanitary effects, therefore, of this department of labour, should be evinced with but little exception in the male population; the death-rate of the female affording an unimpeachable standard of comparison. Now the facts are these: the lead-mining district of Alston loses each year by pulmonary affections 877 males for every 494 females; in Reeth the proportion is 724 to 528; at Pately Bridge it is 508 to 391; and at Aberystwith 491 to 429. In the tin and copper mines of Cornwall, a similar comparison elicits similar results; in the district of Liskeard, the death-loss from chest-disease is, for the males 491, for the females 432; at Penzance, 560 for 456; and at Redruth, the comparative relation of the mortality in the two sexes is 670 to 450.

Whatever may be the effect of coal-mining in the production of carbonaceous deposit in the lungs, it would appear that, as far as these organs are concerned, this employment is incapable of giving rise to active disease: in Glendale 4 per cent. of the male population are coal-miners, in Easington 50 per cent.; yet the male death-rate of the former from pulmonary disease is 215, of the latter only 222 per 100,000. In coal-mining localities, also, the relative proportion of male and female mortality from affections of the breathing apparatus assumes what

we must believe to be its normal condition, the female death-rate being a little higher than the male; but in parts of the country where mining operations are of a mixed character, as in the coal and iron districts of Wales and the North, the male mortality again rises in most instances above that of the other sex; and, although an undue proportion is not so marked as in the purely metalliferous districts, yet, as far as it goes, it bears us out in ascribing to metallic mining a direct influence in the production of pulmonary disease. Before leaving the subject of mines, we must advert to the fact that lead-mining is in advance of all other kindred occupations in originating this variety of morbific influence.

"The women of Liverpool", says Dr. Greenhow, "perish from chest-affections in a rather larger proportion than those of Reeth; in a slightly lower proportion than the women of Alston; but the men of Alston and Reeth die in a much larger proportion than the men of Liverpool. Thus a district remote from city influences, situated in the midst of a most salubrious district, and containing scarcely an appreciable urban character (since, although 29 per cent. of the inhabitants of Alston reside in the town that gives name to the district, the town only contained 2,005 inhabitants in 1851) loses a larger annual proportion of its adult male inhabitants from diseases of the chest, than the unhealthiest city in the kingdom. That this is due to the nature of the prevalent employment, no doubt can be entertained. It is the injurious character of the male occupation which causes Alston, the most exclusively lead-mining district in England, to be the place in which there is a larger proportion of widows than in any other place in the kingdom." (p. 63.)

There is another circumstance in connexion with this district, which may be quoted in illustration of a well known physical law, which we fear is obtaining elsewhere a far wider and more important theatre of operation. The law to which we allude is, that what was once an acquired peculiarity, becomes in process of time an hereditary predisposition, transmitted from generation to generation. Doubtless this is the true explanation of the high infantile and female pulmonary death-loss which Alston, for centuries a lead-mining district, sustains; a conclusion receiving countenance from the facts, that the inhabitants of lead-mining localities in the North are easily distinguishable from the coal-miners by a peculiarity of aspect, and that the chief adult male mortality is referrible to asthma, a disease the hereditary nature of which is becoming daily more justly appreciated.

From Alston and Merthyr Tydfil to Birmingham and Sheffield, from the Titans to the sons of Tubal Cain, is a natural

transition. In the great seats of metal manufacture, we again find abundant evidence of the relation which subsists between occupation and pulmonary disease. Out of eleven districts distinguished by this species of industry, in ten the male deaths from chest-affections are more or less in advance of the female; in one only, Alcester, is the proportion reversed, and in this a large number of the men are engaged in agriculture, whilst the sexes are nearly equally employed in the special manufacture of the place, namely needle-making. As might be expected, the coarser kinds of metal work, such as iron-founding and nail-making, are not productive of the same amount of pernicious effect with some of the branches of cutlery manufacture, where the workmen inhale an atmosphere charged with fine mechanical particles. The pathology of the Sheffield grinder's disease forms part of the current medical knowledge of the day; we shall not, therefore, here do more than illustrate its effects by stating the male death-rate from lung-affections, as compared with the female, in the three districts, Ecclesall Bierlow, Birmingham, and Sheffield. In the first it is 571 for the female, 736 for the male; in the second, 699 for the female, 838 for the male; whilst in Sheffield, 839 of the latter sex die for every 670 of the former.

The other branches of industry which tend to augment the death-rate from pulmonary affections, are the manufactures of earthenware and textile fabrics, including woollen, silk, cotton, linen, flax, lace, and hosiery goods. These are all shewn by the tables before us to be more or less efficient in the causation of disease. In illustration of the agency of the latter class of occupation, a good example is offered by the mortality of the silk manufacturers of Macclesfield and Leek. These districts, "next to Coventry, are the two in which the largest proportion both of men and women are employed in the silk manufacture; they are, therefore, the districts in which we should expect most obviously to observe the influence of silk manufacture on health. In both places a considerable number of females are employed in the prevalent occupation, and in both places the female considerably exceeds the male death-rate. The excess for the whole of life is nearly equal in the two districts; but it is greatest in adult life among the women of Macclesfield, where a much larger number are engaged in this industrial employment. In Leek the pulmonary death-rate of adult women exceeds that of adult men in the proportion of 82 per 100,000. In Macclesfield the pulmonary death-rate of women exceeds that of men in the proportion of 148 per 100,000."

Thus far, we have been considering pulmonary diseases *en*

*masse;* and we have, we think, exemplified to a great extent the part played by occupation in their etiology. Affections of this class, however, divide themselves naturally into two great groups, the tubercular, and the non-tubercular; and which of these is most the product of artificial circumstances, may be a matter of dispute. Phthisis, a malady the predisposition to which is capable of transmission from parent to offspring with ever increasing force, is preeminently the disease of the crowded factory and close workshop. Dr. Baly has shewn how far phthisis is originated and fostered by the exclusion from sun and air, the absence of healthy mental stimulus, the monotonous employment, and the withdrawal from all the life-giving influences of external nature, which are the concomitants of penal confinement. Mr. Simon directs our attention to the analogy between life in the prison-house and life in the textile factory; and that such is no chimera of a mere poetical philanthropy, is by the high phthisical death-rate in the great seats of manufacturing industry placed beyond reasonable doubt. A consideration of this fact becomes absolutely appalling, when we reflect that each adult in whom phthisis is thus originated, may, before he or she succumb to its power, transmit the tendency to children, who, remaining within the fatal circle, add again and again new victims to its deadly influences in an ever multiplying scale, or, floated away in the tide of migratory population, carry with them the germs of destruction to taint fresh springs of existence, and decimate new fields of industry.

That such results are the fated adjuncts of human civilisation, we will not believe. If hygienic teaching be not a fiction, if physiological laws be not the mere day-dreams of a speculative philosophy, civilised man should be the highest type of man, not in intellect alone, but in health in its fullest sense, in bodily vigour, in immunity from disease, and in the power of resisting its influences. This is the end which sanitary science proposes to herself; and to this goal she is capable of conducting any community that will obey her dictates. It is with pleasure we find that attention is already being directed by some of the responsible employers of national industry to the means whereby may be secured to their operatives the development of a well balanced mental in a healthy corporeal existence. From a paper by Mr. Akroyd, in the *Transactions* of the Social Science Association, Mr. Simon extracts the following description of the resources and inducements for healthy recreation, which the author has provided for his nearly five thousand work-people :—

"A library is attached to the works, to which any of my work-people have access free of charge. A news-room is provided, supplied with the newspapers of the metropolis and the locality, and also with the current periodical literature. A band is established at the works, and its performances are very creditable. It plays out of doors occasionally, when the weather is favourable; at other times, in a room provided for the purpose. Allotment gardens are provided for the workmen; and, in connexion therewith, a horticultural and floral society has been established, to promote the knowledge and cultivation of fruits, flowers, plants, and vegetables. An exhibition is held annually, at which prizes are given for the best productions of the respective gardens. To strengthen the habit of observation, and to cherish a taste for the beauties of nature, I give prizes for the best collection of wild plants and ferns growing in the neighbourhood. Recreation grounds are provided for the juvenile and adult members of the establishment, and every encouragement is given to the practice of healthy out-door sports and athletic games."

Is it possible to compute the benefits which would result, were the same means of health, moral training, and intellectual advancement, provided for all the swarming denizens of our manufacturing hives? Were such the case, we should be curious to know what amount in actual money would be annually saved in the one item of widows and orphans provided for at the public cost.

We have dwelt thus long on the pulmonary death-rate, because we conceive that the facts which it brings to light are not as generally known, and have not been urged on public attention in an equal proportion with some other truths of the same nature. Realities of not inferior moment are taught by the district mortality of the remaining wholly or partially preventable diseases which were named in the outset. Space, however, will not allow us to do more than cursorily glance at some of the more obvious of them.

Perhaps the most valuable boon which science has ever presented to mankind, was the discovery of vaccination. By it, amongst many civilised communities, the mortality from small-pox, which previously had numbered its victims by tens of thousands, has been reduced to an insignificant fraction; and it is difficult to conceive a reason why small-pox should not, as far as Europe is concerned, have already become as much a spectre of the past as the black death or sweating sickness. But the facts are that, in considerable districts of England, the land of Jenner, and sixty years after his discovery, during the three months ending March 31st, deaths by small-pox were amounting to a fourth part of the entire local mortality. In the

kingdom, taken as a whole, the death-rate averages between four and five thousand annually; and, be it remarked, that this disgraceful waste of human life does not rest chiefly the opprobrium of rural districts, whose darkness is but partially dispelled by the illumination of science, but its amount is equally furnished by the statistics of our great towns. Plymouth and East Stonehouse have lost annually, during the last seven years, at the rate of 138 in the 100,000 inhabitants; Portsea, at the rate of 101; Derby, at the rate of 76; and Bristol, at the rate of 71. On the other hand, the mortality from small-pox during the same time in Bedford, only averaged 6 in the 100,000; in Stroud, only 8; and in Spalding and Lewes, only 4 each; whilst the districts of Reeth, Blofield, and Romney Marsh, lost by it none of their inhabitants. We are fully aware that, in consequence of the tendency which small-pox exhibits to epidemic prevalence, a low death-rate from that disease, unless the calculation be made from the returns of a very long period, does not convey completely unexceptionable evidence. It may have been that, during the selected period, the peculiar epidemic constitution was wanting, which, had it been present, would have considerably augmented its fatality. But, as is observed by Mr. Simon, the import of a high small-pox death-rate admits of no uncertain construction. It is to be taken as direct evidence, that the practice of vaccination is more or less systematically neglected. Viewed in this light, the small-pox returns published by the Registrar-General are a blot on the civilisation of the English people.

In consequence of the epidemic tendency which distinguishes the prevalence of measles, hooping-cough, and scarlatina, we will attempt to draw no inferences based on their district mortality. But the significance of their death-rate, as calculated for large masses of population, does not allow of misconception. We cannot mistake the meaning of the fact, that the two millions and a half who occupy the north-western counties, sustain yearly a loss by these diseases double in proportion to that inflicted on the four millions inhabiting the south-eastern quarter. Admitting the influence of a dense population in facilitating the transmission of their specific poisons, and the early age at which, in consequence of such rapid transmission, individuals are exposed to their infection, still the immense preponderance of their fatality is surely a proof that other causes are at work to augment their virulence and swell the number of their victims. And this conclusion acquires a tenfold force from the fact that the non-contagious maladies of childhood are equally dominant in these counties. Taken together, they afford sure

ground for the deduction that, in the great centres of English industry, influences prevail which on the one hand intensify the malignity of contagious disease, and on the other, by undermining the energies of infant vitality, prostrate its conservative power.

Alvine flux, under which term Dr. Greenhow includes the three diseases cholera, diarrhœa, and dysentery, has caused during the nine years, 1848-56, 237,498 deaths. This prodigious mortality has of course been distributed very unequally over the period. In the two cholera years, 1849 and 1854, "there were 116,246 deaths; in the two years 1850 and 1855, there were but 29,425, or little more than a fourth part of the former amount." Now the great fact which is brought to light by the statistics of these diseases, is the "astounding inequality" which has marked their local prevalence. Taken as a whole, there can be no doubt that they are increasing amongst us; but their death-rate varies in different districts from nothing, or next to nothing, to between six and seven hundred in the 100,000 inhabitants. Liverpool and Hull are examples of the highest mortality, where the death-rate reaches 662 and 559 respectively; Aberystwith of the lowest, where the death-rate from the three diseases is represented by an annual average of 4 in the 100,000. And be it observed that this inequality does not merely apply to the eminently "fitful and erratic" disease cholera, but a similar disproportion is observed in those diarrhœal affections which may be considered indigenous to our soil. Dr. Greenhow, indeed, shews that cholera itself has never been absent from some of our great towns during the period over which his observation extends, and that in some localities, in 1852, it prevailed epidemically; but the death-rate from ordinary diarrhœa and dysentery varies from less than 10 in some districts, to 305 and 345 in others. And instances of places are not wanting, which have to a considerable extent escaped the visitation of cholera, but have suffered a high death-loss from diarrhœa. Now, whatever may be the exact process of causation in cholera, it is admitted on all hands that these diseases are the immediate result of the introduction into the system of organic impurities.

"Nothing in medicine is more certain", says Mr. Simon, "than the general meaning of high diarrhœal death-rates. The mucous membrane of the intestinal canal is the excreting surface to which nature directs all the accidental putridities which enter us. Whether they have been breathed, or drunk, or eaten, or sucked up into the blood from the surface of foul sores, or directly injected into blood-vessels by the physiological experimenter, there

it is that they settle and act. As wine gets into the head, so these agents get into the bowels. There, as their universal result, they tend to produce diarrhœa; simple diarrhœa in the absence of specific infections; specific diarrhœa when the ferments of cholera and typhoid fever are in operation."

If this be the case—and to the general doctrine we cannot refuse our adherence—how completely must this class of disease be under the control of society; and what startling proportions does this consideration assume, when we are informed that, "if the diarrhœal death-rate of England generally were *ten times* the minimum local diarrhœal death-rate, there would be an annual saving in England of nearly 20,000 lives!"

Did our limits permit, we might draw from the statistics of continued fever facts equally pregnant. We can only record that 17,371 persons are each year sacrificed in this country to typhus and typhoid fever, forms of death which the experiences of every camp, hospital, and gaol, in modern Europe have proved to depend, either for origination or development, solely on causes of human production.

Before we conclude, however, we would especially draw the attention of the reader to the facts connected with infantile mortality, and in particular to that arising from the nervous diseases of childhood. There die annually of the three affections described in the Registrar's report as convulsions, hydrocephalus, and teething, 37,000 children; taken together with the other principal non-contagious diseases of young life, viz. diarrhœa and pulmonary inflammations, these year by year conjointly destroy about 72,000, and constitute one-sixth of the entire mortality of England. Now the district mortality from the convulsive disorders of childhood varies in different localities from 280 to 3,832; from infantile pulmonary affections, from 213 to 2,897; from infantile diarrhœa, from 28 to 1779; and it is, as a rule,* in the great industrial urban districts that the chief excess of mortality obtains, in fact, under the same local circumstances which augment the death-rate from measles, scarlatina, and hooping-cough. That the convulsive diseases of infancy are produced and fostered by a foul vitiated atmosphere, is placed beyond question by the experience of the Dublin Lying-in Hospital, where, by ventilation of the wards, the mortality from convulsive affections of new-born children was reduced to one sixty-

* The three Welsh districts, Carnarvon, Merthyr Tydfil, and Wrexham, present a very high mortality from the nervous diseases of childhood. The remarkable excess which in this particular characterises Carnarvon, an otherwise healthy district, must be considered exceptional, although at present inexplicable.

eighth of what it had been fifty years previously. With such a fact before us, can we reasonably doubt that the admission of fresh air into the close rooms and unventilated lodging-houses of our working population would be a step, and a considerable one, towards saving some of the 37,000 children annually sacrificed? Another point to be observed is, that it is in the factory districts where female labour is most in request, where children are deprived of nourishment from the mother's bosom and lack exercise in the mother's arms, that the human blossom most surely falls unexpanded. And, remembering that a high infantile death-rate is not merely the standard of mortality, but is the gauge of health and strength in the young population, that for every infant that dies another struggles through the same sickly childhood, to emerge a stunted feeble being, incapable of high physical or psychical development, we cannot shut our eyes to the terrible truth implied in the deduction, "that high local mortalities of children must almost necessarily denote a high local prevalence of those causes which determine a degeneration of race."

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## IDIOTCY; ITS WHY AND WHEREFORE.*

To whom does the study of idiotcy and its causes belong? To the psychologist? He has laid sole claim to it. To the sanitarian? He has scarcely put forth a finger to touch it. But to which class really does it pertain most? We say to both equally. By the two classes of men it is approached in different directions. The physiologist takes idiotcy as a phenomenon to be studied first by itself, in its details, and as a fact; he must put it in the camera, shed the mental sunlight over it, fix it in its personations, and present it to the world, depictured in all its phases. The sanitarian should take the phenomenon as he is taught it in its details, and thence starting,

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* The Causes of Idiotcy; being the Supplement to a Report by Dr. S. G. Howe and the other Commissioners appointed by the Governor of Massachusetts to inquire into the condition of the Idiots of the Commonwealth in 1848.

On Psychological Medicine. By Daniel Noble, M.D. London: Churchill. 1858.

The Human Mind in its relations to the Brain and Nervous System. By Daniel Noble, M.D. London: Churchill. 1858.

The Changes produced in the Nervous System by Civilisation, considered according to the evidence of Physiology and the Philosophy of History. By Dr. Verity. London: 1839.

On the Degeneracy of the Human Race, Physical, Intellectual, and Moral. By Dr. Morel. Paris: 1857.

Twenty-First Annual Report of the Directors of James Murray's Royal Asylum, Perth. Perth: 1858.

proceed from the fact to its causes. We say the duty of the sanitarian *should* be this, because it is a duty which has been neglected. It is scarcely, however, the fault of the sanitarian this neglect; but rather his unavoidable misfortune. His science is new; his co-labourers few; his work laborious; and dealing as yet with more acute disorders,—with epidemics sweeping along in their course, and with diseases of the body which destroy outright. Therefore, has he left the mind and its maladies to his neighbour, but only for a season.

They were still to be lamented the facts we have described, but for the further fact, that the psychologist has not rested at the point where his vocation might seem to cease, but has moved toward the law of causation. Great honour is due to the psychologist for this advancement, to which we willingly award its full praise. The works referred to at the beginning of this paper are all evidences of the debt which the sanitary world owes to the so-called "lunacy doctors". We shall not attempt criticism of these works, for we have not the data for the act; we shall be content to analyze, and by such analysis to lay before our readers what seems nearest in the way of answer to the question, why and wherefore are there a race of men called idiots?

In introducing his researches to the notice of the literary world, Dr. Howe describes how broad a view he and his fellow-commissioners took of the subject before them.

"We did not," he says, "look upon idiotcy as a thing which concerned only the hundred or thousand unfortunate creatures in this generation who are stunted or blighted by it; for even if means could be found of raising all the idiots now within our borders from their brutishness and alleviating their sufferings, the work would have to be done over again, because the next generation would be burdened with an equal number of them. Such means would only cut off the outward cancer, and leave the vicious sources of it in the system. *We regarded idiotcy as a disease of society;* as an *outward sign of an inward malady.* It was hard to believe it to be in the order of Providence that the earth should always be encumbered with so many creatures in the human shape but without the light of human reason. It appeared to us certain that the existence of so many idiots in every generation *must* be the consequence of some violation of the *natural laws*—that where there was so much suffering, there must have been sin. We resolved, therefore, to seek the *sources* of the evil, as well as to gauge the depth and extent of the misery."

"The whole subject of idiotcy is new. Science has not yet thrown her certain light upon its remote or even its proximate causes. There is little doubt, however, that they are to be found in the CONDITION OF THE BODILY ORGANISATION. The size and

shape of the head, therefore; the proportionate development of its different parts; the *condition* of the *nervous* system; the *temperament*; the activity of the various functions; the development of the great cavities—the chest and the abdomen; the stature, the weight; every peculiarity, in short, that can be noted in a great number of individuals, may be valuable to future observers."

In the report itself, Dr. Howe observes:

"The moral to be drawn from the existence of the individual idiot is this—he or his parents have so far violated the natural laws, so far marred the beautiful organism of the body, that it is an unfit instrument for the manifestation of the powers of the soul. The moral to be drawn from the prevalent existence of idiotcy in society is that a very large class of persons ignore the conditions upon which alone HEALTH and reason are given to man."

In another place, he gives the following summary:

"Out of 420 cases of congenital idiotcy examined, some information was obtained respecting the condition of the progenitors of 359. Now in all these 359 cases, *save only four*, it is found that one or the other, or both, of the immediate progenitors of the unfortunate sufferers had in some way widely departed from the normal condition of *health*, and violated the natural laws. That is to say, one or the other, or both of them, were *very unhealthy* or scrofulous; or they were hereditarily predisposed to affections of the brain, causing occasional insanity; or they had intermarried with blood relatives; or they had been intemperate, or had been guilty of sensual excesses which impaired their constitutions."

On the subject of *health*, Dr. Howe remarks:

"The health and vigour of the body may be compared to a man's capital; it is a trust fund given to him by the Creator, of which he may expend the interest in the natural enjoyments of life, but he cannot encroach in the least on the principal without real loss. Every debauch, every excess, every undue indulgence, is at the expense of this capital. A rich man may throw away cents or dollars and not feel it, but he is really poorer for it; and a young man with a large capital of health may daily throw away part of it and still feel strong; but every over-stimulant, every overload to the stomach, is a cent or a dollar taken from his capital; feel it or not feel it, he is poorer for it, and so will be the children born to him."

Amongst the five immediate causes of idiocy, Dr. Howe states as the result of his investigations, that by far the most prolific one is "*the low condition of the physical organisation of one or both parents.*"

"It is said by physiologists that among certain classes of miserably paid and poorly fed workmen, the physical system degenerates so rapidly, that the children are feeble and puny, and but few live to maturity; that the grandchildren are still more puny; until

in the third or fourth generation, the individuals are no longer able to perpetuate their species, and the ranks must be filled up by fresh subjects from other walks of life, to run the same round of deterioration. It would seem that startled nature having given warning by the degenerated condition of three or four generations, at last refuses to continue a race so monstrous upon the earth."

Once more:

"It will be seen by the tables, that by far the greater part of the idiots are children of parents one or both of whom were of scrofulous temperament and poor flabby organisation. It is difficult to describe exactly the marks which characterise this low organisation, but the eye of a physiologist detects it at once. Regarding it as a matter relating to the mere animal man, if a farmer had swine, cattle, or horses, as inferior to others of their kind as many of these people are inferior to other men and women, he would pronounce them unfit to breed from.

"Great pains have been taken to ascertain the physical peculiarities of the blood relatives of most of the idiots whose names are upon the list. In reading over the description of more than four hundred families in which idiots are found, one is struck with the great number of cases in which *scrofulous* affections are found."

In corroboration of the view that ascribes the largest amount of idiocy to ill health and general deterioration of constitution, we have in the Appendix, No. V, of the work before us, an extract from a *Report on Insanity and Idiotcy in Massachusetts, by the Commission on Lunacy, institued by the Legislature of* 1854, and drawn up by Dr. Edward Jarvis, who says,

"There is manifestly a much larger ratio of the insane among the poor, and especially among those who are paupers, than among the independent and more prosperous classes. In this connection, it is worth while to look somewhat at the nature of poverty, its origin, and its relation to man and to society. It is usually considered as a single, outward circumstance,—the absence of worldly goods; but this want is a mere incident in this condition, only one of its manifestations. Poverty is an inward principle enrooted deeply within the man, and running through all his elements; it it reaches his body, his health, his intellect, and his moral powers, as well as his estate. In one or other of these elements it may predominate, and in that alone he may seem to be poor; but it usually involves more than one of the elements, often the whole. Hence we find that, among those whom the world calls poor, there is less vital force, a lower tone of life, more ill health, more weakness, more early *death*, a *diminished longevity*. There is also less self-respect, ambition, and hope, more *idiotcy* and *insanity*, and more crime, than among the independent. The preponderance of mental defect and *disease* among the poor is unquestionably shown by the comparison of the number of lunatics and idiots in the two classes."

Dr. Jarvis then shows by statistics, that in Massachusetts, in the year 1854, the ratio of paupers was to the independent as 1 to 47; whereas the lunatics were in the ratio of 72·9 of persons independent to 100 paupers. Hence the pauper class furnishes 64 times as many cases of insanity as the independent class.

In England and Wales (by the *Report of the Commissioners of Lunacy*), it appears that lunacy among the poor was about forty times as great as amongst the independent. The connection between poverty, *ill health*, and lunacy, is well shown in the following remarks of Dr. Jarvis:

"Whatever depreciates the vital energies, lowers the tone of the muscles and diminishes the physical force, and lessens thereby the power of labour and of production, also lowers the tone of the brain and the capacity of self management. In this state, the cerebral organ struggles and may be deranged; consequently we find in the hospital records, that *ill health* is one of the most commonly assigned causes of insanity. It has its first depressing effect on the energy of physical action and the soundness of the judgment in worldly affairs, and next on the power and discipline of the mental faculties."

Dr. Noble, in his interesting and excellent work on *Psychological Medicine*, adopts the same view of the subject. He says,

"The frequency of mental disorder and imbecility amongst the destitute poor, is readily explained by reference to their wretched food and to the miserable *sanitary conditions* to which they are so largely subjected. These circumstances constitute a fruitful source of psychical depravation, as well as of scrofulous degeneracy. Immediately anterior to the breaking out of the dancing mania, there had been throughout many parts of Europe wide-spread wretchedness and misery among large masses of the people."

"Instances of congenital idiotcy and epileptic imbecility result very largely from poor diet and *defective hygiene* generally."

In another part, he refers to the frequency of dwarfed and stunted intellect, as being found in connection with a scrofulous constitution, and cites Dr. Guggenbühl as considering cretinism to consist in something very much allied to scrofula, if not identical with it. In further corroboration, we may state that Mr. Tyerman, medical superintendent of the Colney Hatch Lunatic Asylum, in his *Annual Report* for 1856, in reference to the "Causes of the Disease," says,

"The debility generally observed, and the frequent association of the cases with the insidious affection known as 'general paralysis' and with epilepsy, implies chronicity of *exhausting causes*, concomitants of the hard struggle for a livelihood in this busy metropolis, and in this busy age; an inference confirmed by facts

related to me by physicians of the lunatic hospitals of the United States of America, in some of which, general paralytic disease is observed to be gradually extending, and to be keeping pace with competition and the excitement of business among our Transatlantic brethren. Some time since I expressed to you my opinion that the disease, as it presents itself in the metropolis, is pre-eminently one of *exhaustion*, and my subsequent observation of its general character has tended more and more to confirm that impression, which is corroborated also by the mode of treatment very generally indicated by the state of the patients and found the most beneficial; a long period of rest, isolation from the excitement of ordinary life, the establishment of regular habits, and the *improved nutrition of the blood*, by a carefully provided *dietary*, being found most important elements in the restoration of its energies to the exhausted brain."

In harmony with the view, that connects idiotcy and insanity with a degeneration of the bodily constitution, Dr. Howe states that,

"In the admissions of the patients to the asylum, the first care has been to put them into the best possible *condition of health and vigour;* to develope strength and activity of body, and to train them to the command and use of muscle and limb."

In connection with this same subject, Dr. Morel's work, *On the Degeneracy of the Human Race, Physical, Intellectual and Moral*, conveys powerful testimony. Dr. Morel points out the degeneracy taking place in Europe from the influence of various causes which act more or less on the constitution and health; amongst these he attributes a large share to *noxious atmosphere*, and states his conviction, that "mental alienation is the last term of a series of degenerations."

"What," he asks, "are in reality the asylums for the insane, but the concentration of the principal degenerations of the human race."

"My actual conviction is, that the insane of our asylums are, in the majority of cases, only the representatives of certain morbid varieties of the race."

"Every where I have heard physicians complaining of the increasing number of the insane, and of the more frequent complications general paralysis, epilepsy, and a more marked depression of the intellectual and physical powers, all of which have contributed to lessen the chances of cure."

"Lastly,—imbecility, congenital, or acquired idiotcy, and other, more or less, complete arrests of development of the faculties of mind or body, indicate in greatly increasing numbers the existence of individuals who receive in fœtal life the principal of degeneracy."

Dr. Morel points out the degenerative influence on the mind and body of the poisonous agencies of marshy effluvia, which

he considers the sole cause of the cachexia, known as cretinism ; and states his conviction, that in large cities,—

"The same pathologial phenomena are evinced, not only in the acute forms of typhus and typhoid affections, but in the etiolations of the race, and a degradation which yields in nothing to that noticed in marshy districts, and in those affected with cretinism."

Dr. Morel shows, moreover, that London, Liverpool, Manchester, and other large cities, are largely and dangerously charged with these noxious and deteriorating influences, and in the following forcible passage he points out how, by the neglect of due sanitary arrangements, man suicidally manufactures the poison which destroys him.

"The chamber of a person attacked with fever, in an apartment in London, where the fresh air does not circulate, is in a condition perfectly similar to an Ethiopian marsh, where heaps of locusts are rotting. The poison is the same, and only differs in intensity. Nature with her broiling sun, languishing air, and putrid morasses, manufactures pestilence on a large scale ; poverty, clad in rags and steeped in filth, excluding the air and increasing the heat, succeeds but too well in imitating Nature."

The view that idiotcy greatly depends on the condition of the constitution ; that it is promoted by the deterioration of the system, by impoverishment of the blood, and by the resulting deficiency in nerve force, is insisted on by Dr. Howe, from a fact not, we believe, sufficiently noticed or appreciated ; that idiotcy is by no means always, or even generally, accompanied by deficiency in the size, or by deformity in the shape or structure of the head.

Speaking of a very deplorable case of idiotcy in a lad of seventeen. Dr. Howe says,

"His head is not very small, nor is it deformed." But he adds, "the family of which he comes, is very *scrofulous*, and degenerate physically. His relatives (especially his mother) are, many of them remarkable for erysipelatous humours, tumours, carbuncles, etc. One of his cousins is idiotic, though not of so low a degree as he is."

Referring to this case and two others, Dr. Howe further remarks,

"Now, the three persons above mentioned do not seem to be idiotic from any *deficiency* in the *size*, or *deformity* in the *shape* or structure of that part of the *organisation* on which the manifestation of intelligence immediately depends ; but there seems to be a want of *power* in that part of the organisation by which the nervous fluid gives energetic action to the frame."

Again, speaking of the measurement of the heads of idiots, Dr. Howe observes,

"It may be stated here, in general terms, that the result of this examination and measurement, shows that no dimensions of the head, except extreme diminutiveness, and no shape whatever can be relied upon as *criteria* of idiotcy. A few of the worst cases of idiotcy, are those in which the head is normal as to size and shape. Nevertheless, the tables show that taking the aggregate of all the cases, an obvious relation is seen between the size and development of the cranium and of its different parts, and the amount of intellectual power, and of the different kinds of mental manifestation." But "because a few persons, with heads below the standard size, have been partially educated, and others with heads of normal size and shape have been hopelessly idiotic, these facts by no means disprove the doctrine of the dependence of mental manifestations upon the structural condition of the brain, because *size* is only *one* of the structural conditions of the brain upon which mental manifestations depend, *quality* of fibre, *health*, exercise, etc., are others essentially modifying it."

This point is further elucidated in the Appendix, No. I, where the importance of *temperament*, or the nature of the tissue of the fibres of the body, especially that of the brain and nervous system, is insisted on.

"The difference of temperament may be recognised by external marks, by the hair, features, skin, proportion of the limbs, and appearance of *fineness* or coarseness in the texture of the body, generally. The perfection of it is best expressed by the single word *blood*, or high blood. There is very great difference amongst men in this respect; the vessel of fine porcelain excels not more in beauty, and especially in fineness of grain, the coarse earthen jug, than does a man of blood or high temperament excel one of low and coarse organisation; no matter, though the first be a North American Indian, the second a prince whose

'Ancient but ignoble blood,
Has crept through scoundrels ever since the flood.'

As the Arabian steed is to the cart-horse, so is the man of fine temperament to the man of coarse temperament."

The opinion here given by Dr. Howe is one at which the physiologist has long since arrived from other, though not less sound, data. We have ourselves expressed in another place to what extent the phrenologists are right, and to what extent they are wrong in their estimate as to organisation and function. We have indicated that in so far as the phrenologist has treated of the conformation of head as one part of the body, he has been right; but that in limiting his observations, on physical development, to the head alone, he has always been wrong. We have shown that a finely balanced brain is unquestionably a grand acquisition; but that like a splendidly built bank

minus an imposing capital, the brain is a poor concern without a good chest and stomach to feed it with its full complement of oxygen, nitrogen, phosphorus, water, and other brain-bullion.

Dr. Howe gives two remarkable instances in illustration and proof of this view, in two idiot boys, both with heads below the standard; but the boy with the smallest head, manifesting much more vivacity, activity, and intelligence, than the second, and, indeed, than several of the others.

"Now, why," asks Dr. Howe, "is it that of these boys, whose idiotcy is caused by want of bulk of brain, the one with the *smallest* brain should manifest the most intelligence, and the most character? Precisely for the reason, that the man of 'blood,' or fine temperament, is superior in these respects to the man of coarse organisation, though his brain be smaller; for the same reason that the Arabian steed is superior to the cart-horse, not only in fleetness, but also in sagacity. This boy's body is of a much finer organisation and his brain, doubtless, is so likewise. In his bodily structure, generally, the nervous system has a greater comparative development than in the second, who is rather of a lymphatic temperament. His features are more cleanly cut and chiselled; his skin softer and more delicate, his hair is finer, his eyes are more lively and fiery, his limbs are more delicately shaped, his fingers are longer and differ more from each other in length. As compared with the other, he is more of what may be called the poetic temperament; he is an idiot, but an idiot made of *finer clay*, and in a finer mould."*

Thus the psychologist, proceeding from phenomenon toward cause, has led us by a process of induction which is irresistible in its force, to the primitive fact that idiotcy is neither more nor less than a chronic disease, the origin of which is impoverishment and imperfect nutrition of the body. He has taught us that it is a disease made by man, the sin of the father visited on the child. Henceforth, therefore, it remains to deal with idiotcy as with all evils not ordained but induced; to prevent it; to treat it as a sanitary question; and enforce the precepts announced by Morel, "that physical is inseparable from moral hygiene," and that those "moralists who have need to be convinced that the moral law can only become fruitful in the sound organism", require summary conversion to the faith of physical science.

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* This important fact of physiology, as regards the development and progress of the human race, is ably illustrated by Dr. Verity.

## SOME ACCOUNT OF A SWINE PESTILENCE.*

We have often endeavoured to fix the attention of the readers of this Review, on the importance of studying the relationships which may exist between the epizootic and the epidemic diseases. We have shown that man is sometimes connected by disease, as by a common tie, with his lower earth-mates. We have shown that through the inferior animal, the higher animal may receive certain of his maladies, and the converse; and we have tried to point out, that in a correct study of those epizootic diseases which are communicable, there is opened the widest sphere of experimental research, and is laid the soundest foundation for the construction of the positive of science, in matters relating to the laws and evidence of contagion.

In pursuance of our previous observations, we this time offer some account of a remarkable epizootic amongst swine, in the United States of America. We had heard of the disease incidentally, at our last issue, but not with sufficient accuracy of detail to warrant any description. This quarter, we are more fortunate. The *North American Medico-Chirurgical Review* for May, contains an able article on the subject, from the pen of Dr. George Sutton, of Aurora, Dearborn County, Indiana. Dr. Sutton has made a long series of researches on the epizootic, and has contributed a paper which will not soon be lost in the rolls of scientific history. From this paper we shall borrow in full all the information it affords, as to the origin, nature, and transmission of the new disease visitor.

The epizootic we are about to describe has received a name. The lay public have called it the "*Hog-Cholera*". The term was chosen hastily, and rather as expressing the virulence and the mortality of the disorder, than the symptoms by which it is characterised. The vast territories over which the pest has swept may be conceived, when the fact is stated, that it has prevailed in the states of Illinois, Kentucky, Indiana, Ohio, New York, Massachusetts, Pennsylvania, and Maryland; spreading widely among the swine family whithersoever it went, and destroying so wholesale, that one distiller alone, in Indiana, lost fourteen hundred hogs in one month, September.

Dr. Sutton very graphically depicts the malady. There was a premonitory stage, during which the hog appeared weak; his head drooped, and sometimes, in a few hours after these

* The North American Medico-Chirurgical Review. May 1858.

symptoms, diarrhœa commenced. There was frequently vomiting. In some cases, the discharges were serous and clay-coloured; sometimes they were dark, sometimes they were muco-sanguineous, resembling the excreta of dysentery. The urine, at first, was generally small in quantity and high-coloured; but as the animal recovered it became abundant and clear; by this sign the men who attended on the animals knew that convalescence was probable. In a large number of cases the respiratory organs seemed to be the parts most affected; there was coughing, wheezing, and difficult respiration. In some instances the animal lost the power of squealing, and the larynx was diseased. There was frequently swelling of the tongue, and bleeding from the nose. In those cases where the respiratory organs were the principal seat of the disease, there was generally no diarrhœa or dysentery. In many instances the disease appeared to be principally confined to the skin; sometimes the nose, the ear, or the side of the head, were very much inflamed; the ear being swollen to twice its usual thickness. The inflammation would spread along the skin, sometimes over the eye, producing complete blindness. Occasionally one or more legs were inflamed or swollen, and the inflammation also extended along the body. The skin, where it was inflamed, was red and swollen. Some had large sores on their flanks, or sides, from three to six inches in diameter. In one instance, at the distillery, the inflammation extended along the fore leg, the foot became ulcerated and sloughed off, and the animal recovered. Some appeared delirious, as if there was inflammation of the brain. Dr. Sutton examined the blood of four hogs which had this disease well marked; they were destroyed by the knife, and the blood, arterial and venous, was caught in a bowl. It was cupped, and presented a well marked buffy coat. Death took place in from one to ten days after the attack. Sudden changes in the weather, particularly from warm to cold, appeared to increase the fatality of this disease. The average mortality of hogs that were in pastures or fed on slop, was from thirty-three to forty-five per cent.; but it was frequently much more fatal if hogs were fed on corn, in some instances ranging from seventy to eighty out of the hundred, and, in many instances, even higher.

From the description of the symptoms, Dr. Sutton describes with great exactness the pathology of the disorder. He gives in this part, his experience of the pathology as it was derived from sixty-seven *post mortem* examinations.

In all cases the inflammation showed evidences of its diffusive character, not being confined in any instance to any one

particular tissue. The skin frequently presented patches of inflammation, and often had a purple appearance. In cutting through parts that were the most inflamed, the skin was swollen, and the cellular tissue was infiltrated with serum. Frequently, however, the skin was merely discoloured, without any swelling whatever. The stomach was occasionally distended with food, and the mucous membrane in nearly every instance presented evidence of inflammation, sometimes extending over the whole stomach, at others, only in patches; it was generally of a deep red colour, thickened, and frequently softened. Sometimes it was covered with a viscid mucus, in other instances there was an effusion of blood into the stomach. The mucous membrane of the small or large intestines, where there had been diarrhœa or dysentery, presented in all instances evidences of inflammation; in patches it was red, thickened, sometimes softened, and occasionally ulcerated; where there had been dysentery, there was generally bloody mucus found in the large intestines. The bladder generally contained urine; sometimes its mucous membrane was inflamed, and in one instance there was an effusion of blood into this organ. In a large number of cases, Dr. Sutton found evidences of peritoneal inflammation, such as redness of this membrane, effusion of turbid or bloody serum, adhesions between the intestines, and between the intestines and sides of the body. In three instances blood was effused into the peritoneal cavity, in one instance more than a quart; it appeared in this case to come from the liver. The liver was occasionally the seat of this inflammation, not only in its investing membrane, but in the parenchyma; sometimes there were abscesses, and in one instance, portions of it were gangrenous. The lymphatic glands were generally of a dark red colour, frequently resembling clots of blood. This disease of the lymphatic glands was of common occurrence.

The lungs were frequently the seat of this inflammation, portions of one or both presenting different appearances, from simple congestion to complete hepatisation; sometimes there was ulceration, and frequently there was a turbid or seropurulent, or bloody effusion into the pleural cavity; and often there were extensive adhesions between the lungs and pleura of the ribs. At first, Dr. Sutton was inclined to believe this malady to be a form of pleuro-pneumonia, but his after observations led him to the fact, that the inflammation was not uniformly confined to any organ. In a number of instances, the mucous membrane of the bronchi was deeply inflamed, and the inflammation extended to the trachea and larynx. In

several instances the larynx was inflamed, resembling laryngitis. One animal, that had great difficulty in breathing and could make no noise, Dr. Sutton caused to be knocked on the head, and on examination he found the mucous membrane of the larynx and epiglottis inflamed and swollen; also the tongue was swollen. There were evidences in several instances of pericarditis, and produced adhesions between the heart and pericardium. The brain, from the difficulty of opening the skull, was examined only in one instance, it was found healthy, although Dr. Sutton feels confidence in its being frequently the seat of the disease.

In relation to the spread of the disease, all the facts yet ascertained go to prove that it is propagated by contagion. To prove this, Dr. Sutton suggested to the Messrs. Graffs, owners of a distillery at Aurora, to try a series of experimental researches. To this they readily consented; and as they were constantly receiving fresh hogs, there was a fine opportunity to make any experiments that were deemed advisable. The hogs on which the experiments were made, were known to be healthy.

1. Six hogs that had been exposed to the malady, by being in contact with diseased hogs, were put into a yard by themselves and fed on slop and corn; on the fourteenth day from the time they were exposed to the disease, they were all unwell; three died within a week afterwards; the rest recovered.

2. Ninety hogs were exposed to the disease, they were put into a yard by themselves, and fed on corn and water, no slop being given; in thirteen days disease made its appearance among them and they continued to die until sixty out of the ninety died.

3. Fifty hogs were put into a pen by themselves and fed on slop. They had not been exposed to the disease. For six weeks they continued healthy.

4. One hundred hogs that had not been exposed to the disease were put into a yard by themselves, and fed on corn and water; for thirty days no symptoms of disease appeared among them. They were then put into a pen with diseased hogs; on the thirteenth day they began to show symptoms of the malady, and the disease rapidly spread among them until forty died.

5. Thirty-three hogs out of a lot of two hundred and sixty-three, were put into a pen by themselves; for six weeks they continued healthy. The remaining two hundred and thirty were put into a pen adjoining which were diseased hogs. In

thirteen days the disease made its appearance among them, and continued until one half died.

6. Four young and healthy hogs were put into a pen, in which, four days previous, diseased hogs had been; they were fed on corn and water. On the fourteenth day they were all unwell, one died on the fifteenth day, and in five days more they were all dead. This experiment shows that infection may be retained in a pen for several days.

7. On the 28th of October, Dr. Sutton inoculated five healthy hogs, from the blood taken from the inflamed tissues of hogs that had died of this disease. On the fourteenth day (November 11th), they were all unwell, and died with but one exception. In three, inflammation spread from the point where they were inoculated, along the skin and down the legs, which became very much swollen. Dr. Sutton does not insist that this inflammation was necessarily caused by the inoculation, as he observes that it did not appear until the fourteenth day, and that many hogs had this external form of disease. From these experiments, Dr. Sutton infers that this disease was infectious, and that the infection had a latent period of from ten to fifteen days. Observations have since led him to consider that the latent period may vary from twelve to twenty days. The experiments also showed, that the hogs in the pens were not dying from strychnine in the slop. A statement was going the round of the papers about this time, that strychnine was used in making yeast in the distilleries, and was poisoning the hogs at these places in large numbers.

The manner in which this disease spread among the hogs from farm to farm in many instances, also showed most conclusively that it was infectious. One farmer had seventy-five hogs turned into a corn-field to fatten. These hogs had been exposed to the disease, had become sickly, and numbers had died. He bought thirty-six more; these were all healthy; they were put into the same field with the diseased hogs; in two weeks they were unwell and numbers died. He bought forty-five more, all healthy, and put them in the same field. In two weeks they began to show symptoms of disease, and in a few days after a number died. Finding that he was likely to lose all his hogs, he sold fifty of the fattest that were left to the butchers in Cincinnati, at a reduced price, as diseased hogs. These hogs, it was said, were purchased for their fat, to be used in the manufacture of lard-oil. After deducting the fifty he sold, he lost out of the one hundred and fifty-six all but ten. A large number of facts could be given, if necessary, to prove the contagiousness of the disease. Hogs that have

been once under the influence of this malady appear not to be susceptible to a second attack. Although placed in pens with diseased hogs, they continue healthy and fatten, and not a single instance could there be found of hogs having this disease twice. There is reason to believe that this malady occasionally prevails at the distilleries in a mild form, as the old hogs at many of these places did not take the disease. On the farms, the old and young hogs appeared to be equally susceptible to the disease.

While by these inquiries Dr. Sutton very clearly proved that the disease was directly transmissible from one hog to another, he further endeavoured to ascertain if such transmission were possible to other animals. A dog belonging to Mr. William Ricketts, of Aurora, was chained near the pens at the distillery, and fed on diseased meat; he continued healthy and grew fat, until the sixth week, when he became unwell, vomited a greenish looking mucus, and died on the third day from the time he first showed symptoms of disease. Two more dogs, both belonging to Mr. Woulf Denderline, of Aurora, were also chained near the pens, and fed on diseased meat. One continued healthy until the fifth week, when he refused to eat, vomited a greenish fluid, had diarrhœa, and died on the sixth day from the time he was first attacked. The other dog continued well until the fourth week, when he was taken with vomiting; no diarrhœa was observed, and on the third day after, he died. Two more dogs, belonging to Mr. John Buffington, were chained at the pens, and fed on diseased meat. One of them died in the third week, with similar symptoms to the first mentioned. The other became out of health on the fourth week. The owner thinking he was going to die, had him removed, and fed on different food. He gradually recovered, though it was with difficulty he could walk for more than a month afterwards. I saw him three weeks after he had been removed from the pens. On making him get up, he would stand with his head down, his body drawn up, his back arched, and in attempting to walk would put one foot an inch or so beyond the other. One of the men who attended the hogs, informed Dr. Sutton, that during the sixteen years he had been employed in this manner, he always kept a dog chained near the pens, which he fed on the flesh of the hogs that died, and this food never before injured his dogs.

From the very infectious character of this epizootic, the question may be asked, could this disease be communicated to the human system? Dr. Sutton is of opinion, that there is no evidence that this disease among swine can be communicated

to the human subject. The men who attend these animals at the distilleries, have spent nearly their whole time for months together, surrounded by hundreds of diseased hogs, and yet among these men at all the distilleries he could hear from, there was no unusual sickness. Also the soap-boilers and their assistants, who were constantly handling the diseased hogs, and breathing the effluvia arising from their putrefying bodies, often intolerably offensive, do not appear to have been affected. While examining the diseased hogs, Dr. Sutton was several times wounded; but the wounds readily healed, and there was no unusual inflammation.

The possible origin of the disease was another point inquired into by Dr. Sutton; and although his researches were not so satisfactory in this respect, we think it right to give them in full. He found on inquiry that, on June 19th, 1856, one hundred and three hogs were brought to the pens at Aurora, from Ripley County; these hogs were unwell at the time, and some of them died the next day after they were brought in. The hogs in the "pens", up to this time, were healthy. After these diseased hogs had been put into the pens, they continued to die from one to five a day, until about one half died. In two weeks the disease appeared in the adjoining pens, and by the latter part of July, the hogs were dying from about ten to twenty a day. Nearly every hog in these pens, about four thousand, took the disease, and thirty-three per cent died. After the disease appeared in a pen (each pen contains about one hundred hogs), it generally was from six to eight weeks before the hogs that were left recovered. A gentleman who resides at Ripley County, on the second farm from where these hogs were brought, informs me that he lost eighty out of one hundred and fifty; that his neighbour, who lives on the adjoining farm, lost about thirty, and that the disease was prevailing in this neighbourhood before the hogs were taken to Aurora. On these farms, then, in this section of the country, Dr. Sutton considers as one of the places in which the disease originated. He could not ascertain how it was introduced into this neighbourhood. These farms are in the interior of Ripley County, away from the river, not near the railroad, or any other public thoroughfare, nor within twenty miles of a distillery. He thinks that he has evidence also, that it originated in several places in Boon County, Kentucky. That it also, occasionally, originates within the pens at the distilleries, he thinks highly probable. There were four thousand old hogs that continued healthy in the pens at Aurora, while the malady was prevailing, which Dr. Sutton cannot account for,

except by considering they might have been under the influence of the disease at some previous period. The introduction of the disease into the distillery in Rising Sun, in Ohio County, was traced to hogs purchased of a farmer in Kentucky. This farmer was sued for damages. A gentleman who was fattening hogs at the distillery, at Patriot, in Switzerland County, states that when he saw the hogs were dying in the county, he refused to buy more, and his hogs continued healthy. Dr. Sutton mentions these facts, because it was stated in the public papers, that this disease originated within the distilleries. He was himself at first inclined to this belief. He thought it was produced from the slop, and from crowding large numbers of hogs together. But he has since fully satisfied himself, that although the disease may, occasionally, arise within the pens at distilleries, it also originates amongst hogs running at large on farms.

From the direct cause of the disease, Dr. Sutton also passes to the consideration of any possible predisposing cause. He relates various meteorological facts, which might be assumed as influencing the disorder; but he shows that these are contradictory, and that evidence is wanting to connect the epizootic with any peculiar atmospheric condition. Altogether, he is clearly opposed to the hypothesis of so-called "epidemic influence".

Such are the facts regarding this new and singular disorder. It reads as a new chapter in disease. The symptoms, as well as the pathology of the disorder, equally point out that the affection belongs to the true inflammatory type. The premonitory depression, the succeeding excitement, the high coloured urine, the buffed blood, the local manifestations, all point to the active inflammatory state, or, in other words, to hyperinosis, as the signal feature of the malady. The disease resembles an acute exanthemata of the human subject, and the more so in that it does not recur. But which of the exanthema? It may have been a form of erysipelas; but if we might offer a suggestion, we should say, that the disease resembles a modified form of scarlet fever, more than any other disorder. It would be an interesting experiment, and one we would respectfully suggest to Dr. Sutton, to inoculate a hog with the blood from a scarlet fever patient, and ascertain whether there could thus be set up a series of symptoms similar to those which Dr. Sutton has so well described.

The idea of the spontaneous origin of the disorder, is one to which we should feel it difficult to subscribe. We should feel a difficulty in such assent in an abstract sense; but the diffi-

culty is still greater when the facts which Dr. Sutton has so laboriously collected are carefully analysed. For while, on the one hand, he offers no proof of spontaneous origin, he gives on the other the best proofs of the necessity of the presence of an infecting animal before the possibility of infection. It is clear, therefore, that the disease has one specific cause: it is feasible that the disease was originally a transplantation to the herd of swine from a human source; or, it is just in the range of possibility, that some organic poison, the product of fermentation at the distilleries, primarily, but capable of reproduction in the organism, was the source of the malady.

We notice in Dr. Sutton's history the omission of one experiment, which should certainly be done. We mean an experiment for ascertaining whether the administration of the liquid excreted matters of a diseased animal, to a healthy one, would propagate the disorder. From the effect of the diseased hog-flesh on the dogs, related in the experiments, we infer that the suggested inquiry would yield an affirmative result. The settlement of this point, would throw considerable light on the mode by which the disease was communicated, and would explain some of the apparent anomalies as to propagation.

We must dismiss from the theory of cause all notion of a meteorological origin for the disorder. The disease is too uniform in all its leading characters, to admit of any other supposition than that, in each and every case, it was the result of a specific poison. Meteorological changes might influence, it is true, the diffusion of the poison. Meteorological changes might influence in some degree the course of the disease in an animal once affected; for in these ways such changes do modify the epidemic influences; but further than this admission, the modern epidemiologist dare scarcely go.

The fact that the disease was not transmissible to the human subject, under the conditions noted by Dr. Sutton, scarcely, as we opine, proves that such transmission was impossible under all circumstances and conditions.

If the disease was, as it would seem to have been, one of our common epidemics in an inferior animal, its retransmission to adult men would, in the majority of cases, be prevented by the circumstance that the people exposed had already been themselves sufferers from the disorder, and therefore were not susceptible, the disease being non-recurrent. From this cause, whole countries of adults escape the ravages of epidemics which are decimating the child population. Nor is it at all surprising, that the flesh of these diseased swine, cooked and eaten, should not communicate the disorder, for it would seem that between cooking and

digesting, all mortal organic poisons lose their rancour, and arrive in the blood in new and harmless combinations.

But we must stop. The description of the epizootic fairly supplied, speculation upon it were better held in abeyance. The disease is as yet confined to America, and will, it is to be hoped, find in the Atlantic and Pacific its boundaries. But in a physiological point of view, it is as interesting as the cholera of man, the black death, the sweating sickness, or any other epidemic visitation. We place its history, therefore, before our epidemiologists, as a record of great importance; and in doing so, we beg to offer to Dr. Sutton our respectful and earnest appreciation of his laborious and carefully conducted researches.

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## SANITARY SCIENCE, PAST AND PRESENT.*

A LITTLE book, very unassuming in its externals, lies before us for review. It bears the title given above; and it formed, originally, the annual address delivered before the British Medical Association in 1857. We have rarely seen so much knowledge compressed into so small a compass.

Going far back into the history of the world, Dr. Robertson, the author of this address, sketches out the hygienic codes of Moses, Lycurgus, and Hippocrates: the great ancient sanitary trio. Thence, he glances at the labours of Galen, Oribasius, Aëtius, Paulus Ægineta, and closes the list of sanitarians of the classic age.

Touching briefly on the revival of sanitary teaching at Salerno, and on the writings of Bacon and Sanctorius, he brings us to later days and later names,—to Sydenham, Ramazzini, Pringle, Tissot, Frank, Michaelis, Zuckert, and others still more modern. Changing then his matter of discourse, Dr. Robertson describes what is now being done in different countries in the progress of the sanitary movement. His descriptions on this point are so useful and accurate, that we transcribe them at length:

*Hygiene in France.* "The first sanitary police in France was established about A D. 1350, and this has been considered the commencement of sanitary reform. During the fifteenth and sixteenth centuries, various ordinances were enacted by which obnoxious trades were banished beyond the boundaries of Paris; but the first council of health in that city was established in 1802, and has

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* Sanitary Science; its Past and Present State. By W. TINDAL ROBERTSON, M.D. London: Walton and Maberley. 1858.

been in full operation to the present time. It consists of twenty-six members including its officers; and though it is not a legislative body, it is always consulted in matters of hygiene, and its decisions are almost invariably carried out. Reports (amounting in number, up to the end of 1845, to 7,518) are published and addressed to the administration. They are included in three great divisions,—*health, salubrity,* and *industry;* and under one or other of these definitions the minor branches of hygienic investigation are comprised.

"Similar councils to those of Paris were established before 1830, in the principal provincial towns; and in 1848, a law providing for a general health ordinance was promulgated by the council of state, and brought into general operation.

"By this law, it is enacted that each *arrondissement* (a district somewhat similar to an English county) should elect a council of health, varying in number from seven to fifteen persons. The members hold office for four years, and they are charged with the examination of all subjects relative to public health which may be submitted to them by the prefect or sub-prefects of the districts. Besides these duties, they must issue reports on medical statistics, topography, and charitable institutions, and the reports for the district are condensed and classified by the councils of the departments before being finally submitted to the minister who has special charge of the health department."

*Hygiene in Germany.* "In the German states, general hygiene has been more extensively applied to society than in any other country. The system consists in a series of subordinate bureaux in direct connection with the home-secretary by means of a central medical section. The director of this section acts as an under-secretary of state; and it is composed of three physicians, two apothecaries, and two veterinary surgeons. In addition to this, there is a central council of health, composed of eminent medical practitioners, who advise the administration on all questions of medical science and hygiene. Reporting to the central board, are provincial boards (*Landes Collegien*), superintended by a government medical counsellor (*Regierungs medicinalrath*), and subordinate to these, are the districts, 335 in number, superintended by the *Kreis-physici.*

"The *Kreis-physicus* must be a surgical physician, and pass an examination in state-medicine, and one in veterinary state-medicine. He is assisted by a district surgeon (*Kreis-wundartz*), and his duties are important and multifarious. Amongst them are the following,—quarterly reports on meteorology, state of the crops, prevailing epidemics, and the veterinary practice of the quarter. The Journal of Public Health has lately instituted similar reports from observers in different parts of this country, the object being to institute comparisons between one district and another, and to collect information on these important subjects. In addition to the quarterly reports, a yearly report on the state of the profes-

sion in the province is required, and medical topography, hospitals, baths, schools, *post mortem* examinations, and a subject which is only just beginning to receive attention here, I mean the collection of agricultural statistics, are all entrusted to the same agency.

"I have been describing the system as it exists in Prussia, and although there is in each German state a difference in points of detail, yet, in each the main features are similar to those which have been mentioned. In Hesse, there is a Kreis-medicinal Rath, or Provincial Physicus, for each district containing 40,000 inhabitants. He is a sort of medical rural-dean, or medical councillor, and subordinate to him are the Physikatsärtze, or officers of health. In Nassau, no physicians practise privately. The whole population is divided into districts, to each of which there is attached a medicinal rath, who is supplied with an assistant and a junior assistant."

*Hygiene in America.* "The first Board of Health in America was established at Boston in 1799. This was modified in 1816, and the two statutes by which these were constituted have served for models, after which succeeding ones have been formed. Under their provisions, the following officers are appointed:—

I. A Superintendent of Streets.
II. A Superintendent of Common Drains and Sewers.
III. A Water Board.
IV. A City Physician, to examine into nuisances, &c.
V. A Port Physician, to superintend quarantine.
VI. Five Consulting Physicians, in case of the breaking out of any dangerous disease.
VII. A City Registrar.
VIII. A City Marshal to act as General Health Officer.

"Great improvements are contemplated; and a commission which was appointed in 1849, to make a sanitary survey of the state, has issued an elaborate and most instructive report, in which a series of measures of importance are proposed, and the necessity for their adoption urged with the greatest energy and effect. Amongst other things, they recognise hygiene as a distinct branch of education. In a report by the Hon. H. Mann, one of the most intelligent writers who have ever taken pen in hand for the service of their country, occurs the following passage:—'All the teachers just out of our normal schools are well grounded in the elements of human physiology. *They introduce it wherever they go.* It has been prominent at all our teachers' institutes. I have lectured upon it hundreds of times, to teachers and school associations, and I estimate that no less than 15,000 annually of the children in our public schools attend to this subject well.'

"The Public Health Act, passed by Congress, April 24th, 1850, provides, *inter alia*:—

"Sect. 1. 'Physiology and hygiene shall hereafter be taught in all the public schools of this commonwealth, in all cases in which the school committee shall think it expedient.'

"Sect. 2. 'All school teachers shall hereafter be examined in their knowledge of the elementary principles of hygiene and physiology, and their ability to give instructions in the same.'

"I come now, after this brief and imperfect sketch of the state of hygiene in other nations, to that in which we are more immediately interested, that of our own country."

From abroad, Dr. Robertson naturally travels home, and having dwelt on Lord Morpeth's Act and explained its provisions, he closes his instructive paper with suggestions as to what has to be performed in the future.

Accustomed to labours somewhat akin to those undertaken by our author, we can appreciate in some degree the amount of research which lies, not on the surface, but at the foundation of his little book, which is, in fact, a most unfair account "of work and labour done". We therefore suggest, that Dr. Robertson let this his present work stand as the mere syllabus of a greater history of sanitary science; a work which, well done, is a desideratum, and would establish his literary fame.

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## THE EPITOME OF SANITARY LITERATURE.

Transmission of Diseases.*

Dr. Lauder Lindsay has published a valuable paper, full of rational suggestion and thought, on the Transmissions of Diseases between man and animals. We give, in the following, the summary of his arguments.

"1. That certain human diseases occur, under certain modifications—which are, however, often comparatively insignificant—in various of the lower animals, both wild and domesticated. Such diseases are cholera, yellow-fever, typhus and typhoid fevers, plague, small-pox, measles, croup, pleuropneumonia, influenza.

"2. That certain 'epidemic constitutions' of the atmosphere affect equally, or, at least, in marked degree, man and the lower animals; or, in other words, that a relation frequently subsists between coincident epidemics and epizootics, or epizootics preceding or following epidemics and such epidemics.

"3. That certain human diseases are transmissible, by contagion or otherwise, to various of the lower animals.

"4. That certain diseases of the lower animals are transmissible to different individuals, species, and genera of these animals.

"5. That certain diseases of the lower animals are transmissible, by contagion or otherwise, to man.

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* On the Transmission of Diseases between Man and the Lower Animals. By W. Lauder Lindsay, M.D.

"6. That certain diseases, communicated to man from the lower animals, are propagable from man to man in the same manner as ordinary contagious human diseases are.

"7. That there are certain modifications in type, character, and degree in transmitted diseases, depending on the habits and structure of the animals affected; and that such modifications must be carefully studied, in order to a correct appreciation of comparative pathology.

"As subsidiary or collateral propositions, I would further state my conviction:—

"8. That the study of the diseases of the lower animals is calculated to throw much light on our knowledge of various obscure human diseases, and specially such as possess an epidemic character.

"9. That the same study has an important bearing on the health of our flocks and herds, the integrity of our agricultural interests at home and in the colonies, and on the use of the flesh of the domestic animals as food for man.

"10. That the pathology, especially, of the diseases of the lower animals, requires an extended and more accurate study in this country.

"11. That experimentation on the lower animals, as to the transmissibility of diseases to or from them and man, is one of the most promising means of arriving at sound conclusions as to the nature of various wide-spread diseases, both in them and in man.

"12. That, with a view to the proper conducting of experiments, it is necessary to make a selection of the animals to be operated upon, according to the nature of such experiments, or of the diseases to be studied."

A Special Exercise for Consumptives.*

Dr. Henry G. Davis, of New York, proposes a special exercise for consumptive patients, which, as he presumes, takes the better place of common walking exercise, or forced voluntary inspiration. In the exercises which he recommends, he makes the hands the fixed point, moving the body towards them, or suspending a part or whole of the weight by them. In this way, as he supposes, more or less of the weight of the body is thrown upon the pectoral muscles, and as they arise from the sternum and ribs, they act upon them in the same direction that they do in voluntary inspirations, without the fatigue that follows that effort. At the same time, involuntary respiration goes on without being disturbed. The author considers that it is immaterial what the exercise is, so long as the hands are made the fixed point. The patient may suspend himself by the hands from a bar, climb ropes by the hands,

* Special Exercises in the Treatment of Diseases of the Lungs. By Henry G. Davis, M.D. New York: 1858.

swing by hand suspension, or if feeble, lean on some object with his hands at arms length, the object being of such a height that the body will be inclined at an angle of thirty-five or forty degrees; in which position the pectoral muscles will support a portion of the weight, and thus enlarge the chest. To secure the full advantages to be derived from this mode of exercise, it should be prosecuted faithfully. When commenced, it should be repeated every half-hour until a considerable degree of fatigue is produced.

We describe Dr. Davis's plan as one which may be useful on wet days, but as very inferior to walking exercise, when the weather invites out of doors.

Compositors and Consumption.

The Report on the Sanitary Condition of the Army recently published, proves that our soldiers, but especially the infantry of the line and the foot guards, are subject to a very high mortality, a great part of which is attributed to pulmonary consumption. It is assumed in the Report that this excess of mortality from consumption is traceable, at least in part, to the narrow space allotted to the soldier in the barrack and guard-rooms: but as no proof of the dependence of pulmonary consumption on this cause is given in the Report, Dr. Guy republishes in Beale's *Archives*, from his evidence laid before the Health of Towns Commission in 1844, the following table based upon measurements of the offices of letterpress printers, and the number of compositors working in them, together with the answers to certain simple questions addressed to the men themselves.

| | No. per cent. subject to Spitting Blood. | Catarrh. |
|---|---|---|
| 104 men having less than 500 cubic feet of air to breathe | 12·50 | 12·50 |
| 115 men having from 500 to 600 cubic feet of air to breathe | 4·35 | 3·48 |
| 101 men having more than 600 cubic feet of air to breathe | 3·96 | 1·98 |

The number of compositors who answered in the affirmative Dr. Guy's question, Had they ever spit blood? corresponded very closely to the number actually suffering under consumption; just as the number stating that they were subject to colds afforded a good indication of the number in the three classes who were predisposed by the same close and confined atmosphere to suffer by exposure to the common causes of diseases of the chest.

Cholera and Juggernaut.

Dr. Nash, in a paper on Public Hygiene, published in the *Indian Annals of Medical Science* for 1858, adds a letter from the native medical subordinate of the Madras medical establishment, Mr. W. Vencataswamy Naidoo, on the causes which give rise to cholera

amongst the pilgrims at Juggernauth. Having given an account of the sort and quality of the food prepared in the temple, and sold at enormous prices to the deluded pilgrims, the native writer, whose style we retain, relates thus :—

"People undergoing every fatigue and toil of long journeys, with privation of food and rest, arrive at their tabernacle half-starved or much exhausted, and have a small enclosed room pointed out by the pundahs for the accommodation of twenty or thirty persons; as soon as they have their baggage secured, they repair to the temple, washing themselves in different stinking ponds, and wearing wet or silk clothes (as an undefiled dress), visit the image, eat the various sorts of food with eagerness, taking no notice whatever of its condition, taste, or quality, under a well impressed idea that such observation would be an act of blasphemy, drink a jumboo-full of very sour rancid tyre, and feel themselves refreshed and very much satisfied for the first day, but from the second or third day the causes of diarrhœa, or cholera, well known to the medical world, viz., sudden transition from heat to cold, aliment of indigestible character, acrid food or acid drinks, oily and putrid substances, and want of free ventilation and drainage, soon operate upon the supposed repenters of sin.

"The streets and houses are impregnated with noxious exhalations emanated from the decomposition of the excrementitious and urinous deposits with which the streets, valleys, fields and plains are filled during the assemblage of people in great numbers, as well as from the dead bodies thrown out in the fields and in the towns.

"Cholera having thus originated, great alarm and despair are produced among the pilgrims, and the fright and despondency on one hand, and their longings for home, relatives or friends on the other, act conjointly as depressing agents, rendering their system more favourable to the action of the causes of cholera. The ravages made by this disease annually are very lamentable; and most pitiable is it to observe the annual scene at Juggernauth resulting from deaths in vast numbers, making children motherless or fatherless, or altogether orphans, women as widows, men as widowers, and afflicting others with the loss of brothers, sisters, etc. The loss of property is also effected, and many reach their native towns as beggars, being destitute of food, raiment, friends, relatives, money, or property. However much the deaths among the pilgrims may be ascribed to their moral depravity, still the deprivation of the sanitary reform so urgently needed at Juggernauth is a thing most deplorable."

The type of continued fever.

Dr. Murchison issues a brochure *On the Changes which are supposed to have taken place in the Type of Continued Fever.* He maintains that so-called relapsing fever has been at all times remarkable for its small mortality as compared with that of

ordinary typhus, and that in computing the influence of treatment by blood-letting, no inference can be correct which classes the relapsing fevers with the more ordinary forms of typhus and enteric fevers, and adduces therefrom the view that a change has taken place in the type of fevers generally. Having collated many facts, he offers in conclusion the following inferences from them :

"1. In comparing the mortality from continued fever at different times and places, or for the purpose of judging of the merits of different plans of treatment, it is essential to take into account the form of fever which has prevailed.

"2. The small mortality, and the frequency of sudden improvement in the symptoms, which were observed to follow venesection in the epidemic of 1817-20, and which have been attributed to that practice, were characteristics of the relapsing form of fever which then prevailed, and have been equally characteristics of it at all times, even when blood-letting has never been resorted to.

"Consequently, it is not a legitimate argument in favour of a change in the constitutional type of fever, to contrast the mortality after blood-letting in the *relapsing* epidemic of 1817-20, with what would be the effects of bleeding in the *typhus* of the present day."

Chemical manufactories and public hygiene.

In August 1854, the Belgian Government appointed a commission to investigate the effects of chemical manufactories on the operatives employed, as well as on the vegetation in the neighbourhood. The results of the labours of the commission are given in the *Journal de Chimie*, and in the *American Medical Monthly*, for July 1858. The conclusions of the committee are summed up as follows :

*Influence of Manufactories on Plants.*—"The conclusions of the commission are summed up as follows: 1st. Acid emanations, which escape from manufactories of chemicals, are capable of injuring the growth of certain plants; 2d. Nevertheless, the effects are produced in such an unequal way upon different kinds of ligneous and herbaceous plants, as that certain species appear to resist the harmful influence of the acid gases very well, while others are injured by the same, but to various extents; 3d. Among the last some cease to show any sign of alteration, even at a slight distance from the manufactories, whilst the alteration of others is effected at great distances, but always within certain limits; 4th. The radius of the injurious influence of such acid gases depends on several circumstances essentially different, but which cannot be absolutely determined; although in each given case they can be determined practically by observing at what distance vegetables, which are readily injured by the emanations, cease to present such special alterations as could be ascribed to their action; 5th. The radius of injurious influence, determined in this way, differs very

much, not only in different establishments, but even in different directions from the same; and it was always greater in the direction of the dominant winds, whilst in the direction of winds less frequent it was always small and inconsiderable; 6th. In the direction of the dominant winds, the influence did not extend beyond 2,000 metres as a maximum, nor below 600 metres as a minimum.

"*Influence of Manufactories on Population.*—From the data collected by the government for five years, with reference to births and deaths, it appears that the means were favourable to the increase of population, as well in the districts where the manufactories were established as in those adjoining. Thus, from 1839 to 1843 the ratio of deaths was one in sixty-six, and from 1844 to 1848, one in fifty-eight. It is remarkable that no case of cholera had appeared in these manufacturing districts, and that, with the exception of Floreffe, all were exempted from the typhoid epidemics which have prevailed in the province since 1843. During the epidemic of Floreffe, which raged in the hamlet of Buzet, where there were seventy-five sick, only one of the labourers who worked in a chemical manufactory was attacked by the disease, and he had taken a long journey two days before.

"A report of Dr. Cambrelin, president of the Medical Commission of the province of Namur, states, that the emanations from the chemical manufactories of the valley of the Sambre do not give rise to any peculiar affection, and that the diseases of the chest are not now as frequent as formerly in the districts where the manufactories exist. The general health of the neighbouring population remains the same as in the past—even that of the labourers occupied in the manufactories; and if they are ever attacked at the beginning of their apprenticeship with laryngitis, bronchitis, or difficulty in respiration, custom soon causes these indispositions to disappear, without any recurrence. The same observations are made as to the horses employed in the establishments.

"Thus, contrary to expectation, the ratio of mortality is diminished in the midst of these manufactories of chemicals; but should this diminution be attributed to the direct influence which these manufactories have on the health of the workmen and the population? No one would dare to assert this. These manufactories have contributed, in one sense, to this happy result, by extending comfort around them, and offering regular employment, with suitable wages, to a portion of the population. In any point of view, and whatever part we may wish to ascribe to them in the way of direct influence, none of the facts will authorize us to conclude that these manufactories have exercised an *injurious* influence on health, and that they are not a cause of prosperity for the countries in which they have been established."

Of the other books and papers before us, given in the book list, we select a few for brief reference. A book entitled *Health and Disease, their Laws, with Plain Practical Pre-*

*scriptions for the People,* by Benjamin Ridge, M.D., is an elegantly got up work of considerable thickness, and implying a month's hard reading. We are nervously anxious on all occasions to do our duty, without fear or favour, in this department of the Review, and yet instinctively shrink, however urgently it may be called for, from the painful task of writing condemnations or of exciting the feelings of the many against an unfortunate writer, whose only fault may be that of condemning himself in his own book. This feeling, morever, holds the more imperative sway, when it is clear that the mental poverty and not the will of an author supplies the occasion for the critic's display of justice unmoved by mercy. We therefore feel it to be the kindest act, both to ourselves and the book before us, to say the best word for the intention, and to leave the subject matter to reviewers of a sterner mould.

Mr. Peter Hinckes Bird, in a work *On the Nature, Causes, Statistics, and Treatment of Erysipelas,* concludes (*a*) that erysipelas is merely an example on the skin of that diffuse inflammation, which in other tissues constitutes diffuse inflammation of the mucous membrane, diffuse phlebitis, puerperal fever; all of which have a common origin, a poison in the blood, are infectious and contagious, and may mutually produce each other. (*b*). That the term erysipelas should be confined to diffuse inflammation of the skin, and subcutaneous cellular tissue. (*c*). That erysipelas is best treated by stimulants and support; and when complicated with inflammation of the subcutaneous cellular tissue, by early incisions which should extend to the depth of the disease.

Mr. J. C. Clendon, in a reprint *On some Forms of Disease arising from the Retention of Decayed Teeth,* calls attention to the mischiefs which occur in the shape of neuralgia, abscess, contraction of the facial muscles and paralysis of the face, from the presence of teeth in various stages of disease. He declares, that when once a tooth has been the subject of acute inflammation, it is virtually doomed; he is frequently reminded reproachfully, he states, that there are dentists who "never extract teeth; they can stop anything!" and he believes it; for he is often called upon to extract a tooth that has been stopped when in a state of active inflammation; a practice which cannot be in accordance with any principles of science, but must proceed from sheer ignorance, or something worse; for, unfortunately, in dental practice, it is often far more lucrative to suppress the truth than honestly to declare it. Mr. Clendon states, that many complaints which come under the notice of the practitioner as diseases of the body are, in reality,

diseases of the teeth, and that there are no parts which more widely and universally affect the general system than the teeth: an observation in which an important truth is exaggerated into positive error.

Four letters to Sir James Clarke, bart, on *Administrative Reform, in Relation to the Medical Schools and the Examining Boards,* although containing a mistake in prophecy, as to the results of Mr. Cowper's Bill, supply much excellent suggestive matter on the subjects of which they treat; we hold the book in store for another and more general purpose.

Reports on the Sanitary Condition of St. Pancras, by Dr. Hillier; on St. Giles, by Dr. Buchanan; on the City of London, by Dr. Letheby; and on Bethnal Green, by Mr. Pearce,—each, medical officer of health for the respective districts,—are instructive documents like all which have appeared from the new order of sanitary officers appointed under Sir Benjamin Hall's Act. We have in progress an analysis of all these documents.

A tract entitled, *Observations on the Process Patented by M. Falcony, for Embalming and Preserving the Deceased,* contains several testimonials, from men of eminent position, bearing on the success of Falcony's application. The chemical preparations used by Mr. Falcony are of two kinds; one is a white powder, mixed with sawdust as a vehicle, and intended only for temporary preservation. The other is a liquid for injecting into the arteries, and is intended for the permanent preservation of the dead body. Mr. Luther Holden, Mr. Stanley, Dr. Ferguson, Mr. Paget, Dr. Baly, and Mr. Tom Taylor, have all borne testimony to the success of these preservations. We have ourselves seen the result of one experiment with the liquid, at the Grosvenor Place School of Medicine, which promises well. We are unable this time to give the exact composition of the antiseptic. It is probably a preparation of zinc.

We must not conclude this notice without congratulating sanitary reformers on the fact, that a new periodical is added to literature in the shape of the *Edinburgh Veterinary Review.* The talented and learned editor of this serial, Mr. John Gamgee, has a full appreciation of the meaning of hygienic medicine, and of the connexions which exist between the diseases of men and animals. Departing from the old routine of bare curative practice, Mr. Gamgee aims at teaching the higher object of veterinary science, namely, the *prevention* of diseases. His first number is admirably arranged, is distinguished by sound literary ability, and if sustained in the same manner will carry with it all the success it deserves.

# ORIGINAL COMMUNICATIONS.

## EPIDEMICS AND THEIR EVERY DAY CAUSES.

By W. I. COX, M.R.C.S.

[*Concluded from p.* 70.]

### III.—THE USE OF FOUL WATER.

It is with considerable diffidence that I venture to add my mite of observation on this head, to the gigantic labours of one of the most talented and indefatigable philosophers of the day—Dr. Snow. Foul sources of water-supply form a very common and little regarded evil appertaining to dwellings otherwise well appointed and salubrious. How frequently in country villages may be seen a pump, or draw well, in the midst of a farmyard or filthy court; receiving the surface drainage of heaps of stable manure, pigsties, etc. What is the almost inevitable result?—Water highly charged with organic matter in a decomposing state gradually, but constantly, percolates through the shallow stratum of soil, and effectually contaminates the source where the house supply is obtained. How often do we notice green, slimy, stagnant pools, in the close vicinity, and affording the sole water supply of cottages. It is unquestionable, that one of the most frequently occurring causes of impurity, is the contamination of wells and streams by sewage and percolation through soils saturated with organic fæcal matter. Of course, *slow* percolation through a deep and gravelly soil would effectually rid the surface water of its organic impurity. But this is not often the case. It is well known that surface water possesses a strong affinity for organic matters, which are diffused over every surface in the neighbourhood of living beings. The large relative amount of the *nitrates*, found in even very deep wells in large towns and near graveyards, sufficiently testifies to this fact.

Waters tainted with various organic matters,—whether gaseous, as carbide or sulphide of hydrogen; or solid, as putrescent vegetable fibre; or vitalized, as algæ, confervæ, hydræ, fungi, infusoria, etc.,—are a very frequent cause of severe visitations of *bowel complaints* during the summer months. Several instances came under my own observation in 1853 and 1854, of the aggravation of *epidemic diarrhœa* from this cause. That water falling on a growing soil, and running off to lie in stagnant pools, is sure to become tainted with animal and vegetable life, is well known; and when to this is super-

added the circumstance of the said soil being highly charged with effete organic products, the water thus collected must necessarily be highly impure, and most unfit for human consumption. Yet very often it forms the only available source of supply. As an instance, I may mention a large piece of common land in the districts wherein I now reside, on which stand thirty or forty cottages; the inhabitants of which use no other water than that afforded by surface pools; the majority of which are, during the summer and autumn, covered with vegetable life, slimy, and bubbling with the liberated products of decomposition. They are all uncovered, sunk below the general level of the ground. Hundreds of donkeys, pigs, and geese, graze close to the brink. The population in these cottages are of stunted and miserable appearance. Several deaths occurred among them from choleraic diarrhœa last autumn: the neighbouring village remaining free from such a visitation. Whenever fever occurs there, it is always of bad type and difficult to eradicate. I have examined the water from the largest pool; it contained (September last) five grains of organic matter in the imperial gallon.*

*Scarlatina simplex* was epidemic in a small agricultural village, in the west of England, in August 1856. There occurred in all, thirty-eight cases, chiefly among the peasantry; whereof three proved fatal. Now *two* of these fatal cases were in *one* house, the residence of a wealthy farmer. The disease therein changed its character; assuming the worst asthenic type, with intense throat affection, and, as is so frequently the case, defying all treatment. The persons attacked were a servant girl and three children. The two eldest children, aged respectively seven and five years, died. The younger child and servant recovered with some difficulty. In no other house in the village, not even in the poorest cottage, did the disease take on the malignant type. This sad visitation was considered mysterious and wholly unaccountable. The following facts, however, seem in my humble judgment to elucidate it. The water supply of the farmer's family I found to be derived from a shallow drawwell in the back yard, imperfectly covered; surrounded by heaps of decomposing manure and cowsheds, —the black drainings from which were constantly flowing over the soil. I examined the water from this well on two occasions, *before* and *after* heavy rains. The first analysis showed sixty grains of solid matter (chiefly nitrates) in the gallon; whereof five grains were undecomposed organic matter. The

* Water containing more than four grains in the gallon is unfit for use.

second analysis (after the rain) gave the enormous amount of between seven and eight grains of organic matter. On the latter occasion, the water in large bulk showed a greenish tinge of colour; and exhaled a disagreeable odour after having been kept in a closed vessel for ten days. The rest of the village derived its chief supply of water from a good public well, situated at a little distance in a large field, and well covered from the weather.

The dependance of outbreaks of *cholera* on the use of foul water, is now too well known to be questioned, even by the most sceptical on such points.

In a horrible plague spot near the metropolis, which existed until very lately in Kensington parish, there was afforded, in September 1849, a practical example of the fatal effects of the accumulation of filth around dwellings, where the water is not brought from a distance; and of the absurdity of hoping that such consequences can be confined to the neighbourhood where they originate. This place (called the Potteries), comprised about two hundred and forty houses, inhabited by eight hundred and sixty wretched beings; as filthy and degraded as in the south of Ireland. The place also abounded in pigsties. There was no sewerage,—no drainage. Water was properly supplied only to sixty houses The remainder derived their supply from foul ditches, stagnant fetid pools, and a few shallow wells on the premises; the water of which latter (from the organic matters soaking into them), was equally noxious with that of the pools and ponds. I examined four specimens of the water used by these people,—two samples from wells, and the remainder from the largest of the pools above-mentioned.

No. 1, from the deepest of the wells, contained fifty grains of solid matter in the gallon, chiefly the nitrate salts. No. 2, fifty-six; six grains of which were organic matter. The other two specimens yielded seven and eight and a-half grains respectively, in the gallon, of organic matters. These last specimens were foul in appearance, and exhaled an offensive odour. Asiatic cholera broke out in this locality with dreadful virulence in the month above-named; carrying off from the slender population two and three a day. It speedily reached a new and well built terrace of good houses, situated at the distance of a quarter of a mile; whence it swept away eight lives in the course of six days.* In 1853, another outbreak occurred in this place, attributable to the same cause.

In September 1853, the cholera suddenly appeared in the

* See the first volume of "Household Words", p. 463.

district of Kensal New Town, where I was then resident. Seven deaths occurred during the first week of its visitation. With one exception, however,—the case of an habitual drunkard,—its victims were *exclusively* confined to those of the inhabitants whose dwellings had *no water* "laid on," and who used for household purposes the abominable contents of the canal, or "cut", bordering the district. On examination, I and other observers found this water highly charged with organic matters. How, indeed, could it be otherwise? Chamber utensils were being constantly emptied into it at all points; whilst the carcases of dogs and cats and animal refuse of every description were frequently to be seen floating on its surface.

The town of Bridgend, in Glamorganshire, is healthily situated; but, until very recently, its water supply was dependent on the river on the banks of which it is built. As this stream (a mere rivulet in summer) received all the sewage, and human egesta were poured into it from a hundred houses, its waters must necessarily have been, especially in the season of drought, very unfit for use in the lower parts of the town. For many years past it was remarked, that fever visiting this locality, generally assumed *a low and fatal type.* Cholera, however, was a stranger to it until, in August 1854, this dreaded visitant appeared suddenly, whence, no one could say; and carried off several of the inhabitants of the lower portion, in a few days.

### IV.—PRIVATION OF SOLAR LIGHT.

Light is of very great importance to the health and well-being of the human race. Self-evident and trite as this statement may appear to be, its practical importance is only just beginning to be felt, even in this highly civilized and scientific age. To healthy life of body and mind, the luminous principle of the sunbeam is certainly essential. This truth, however, has been disregarded to a melancholy extent in the construction of thousands of dwellings and workshops; and it appears to have been thought that the finely organized human frame could receive no detriment from the permanent absence of agencies, which the Divine Creator and Upholder of the world has employed to quicken and develope vigorous life. Dr. Brown, of Chatham, has ably illustrated this in a late number of this REVIEW. I also, in my essay on "Colliers' Diseases", in the same Journal (vol. ii), have already spoken at large of the injurious effects of the privation of the sun's rays on a large class of our artizans. I shall, therefore, now add but little on the subject. The most carefully collected sta-

tistics prove incontestably that, *cæteris paribus*, the inhabitants of underground and ill-lighted rooms are more frequently the victims of epidemic disease, than those persons who are better off in that *sole* point. Dr. Edward Smith, in his interesting paper recently read before the Royal Society, tells us that, in the course of his experiments on respiration, he found darkness the first and most powerful agent in decreasing the quantity of air breathed in a given time. *Ergo*, the absence of light *directly* tends to lower the vital forces, to check and render torpid the secreting and excreting processes, and to predispose the frame to the inroad of zymotic disease. This is not, however, generally credited. On the contrary, when a poor person inhabiting a dark, close hovel, is laid up with fever or scrofula, nobody thinks of attributing his illness to the right causes,—a want of God's light and pure air. No; it is a "chill", or over work; and the victim lies almost unheeded; and the epidemic gains ground, whilst the evils, which effectually preclude the usefulness of ordinary remedies, are perpetuated in ignorance.

Especially does *cholera* show great liking for darkness and humidity, its almost invariable associate. Perhaps, indeed, I am justified in saying, that no single predisposing cause, operates more certainly, than dwelling in a dark damp habitation. In July 1849, a severe outbreak of the epidemic occurred at a place called Woodhead, on the Sheffield line of railway, many miles distant from the nearest spot where the disease was raging. This was afterwards considered, and I think logically, attributable to the dark, damp tunnel, wherein the navigators were at that time working.

The connexion of physical with moral darkness, vice and immorality, and its consequent *in*direct but certain influence on the predisposition to disease, is also sufficiently patent. It was an awful truth, which was ages since enunciated from the lips of One who could not err,—"Every one that doeth evil hateth the light; neither cometh to the light, lest his deeds should be reproved."

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I shall now proceed with the *second* class of the every-day causes of epidemics; and commence with the greatest and most extensive, viz.—

### I.—INTEMPERANCE.

No predisposing cause of epidemic disease, arising from the social habits of the people, has been rendered to observers more plainly apparent, than the habitual indulgence to excess

in intoxicating drinks. In every town and district where fever or cholera makes its appearance, it is always seen that the drunkard is the first affected. I forbear to adduce examples, for I should not know where or which to select. The contents of my note-books would enable me readily to fill an entire number of this REVIEW, with proofs of the direct and potent agency of intemperance in the development and aggravation of epidemic diseases,—cholera especially. Fellow-labourers in the field, of higher note and better authority, are entirely confirmatory of my views and experience on this head. Dr. Elliotson, speaking of the visitation in 1832, remarks, "I clearly ascertained that those who had everything calculated to keep them in good health, but who indulged in spirit drinking, were sure to become victims." Dr. Babington, in his report, read last year before the Epidemiological Society, of the Visitation of Cholera in the Black Sea fleet, in 1854, gives among the very first predisposing causes—intemperance and bad food; and states that the immunity enjoyed by certain of the ships, depended on the sober and regular habits of the men. During the visitation of 1849, when I was busily engaged in the study and treatment of this awful epidemic, I noticed that the weekly extra indulgences, too commonly the habit among the working classes, on Saturday night and Sunday, almost invariably brought me a fresh and disproportionate number of fatal cholera cases on the Monday. The same significant circumstance was observed at Newcastle, in 1853. (See the *Lancet* for that year.) The Registrar's report for the Monday was, during each visitation, swelled weekly to a lamentable number, from the same obvious and preventible cause.

Reasoning *à priori* would lead us to expect this. The effect of the imbibition of alcohol is to diminish the amount of carbonic acid eliminated from the skin and lungs. Valentin, Prout, Fyfe, and Vierordt testify to this fact. Dr. E. Smith, in his admirable paper already alluded to, spoke of brandy and beer as greatly decreasing the respiration, and the quantity of carbonic acid exhaled. Dr. Bocker found, from his experiments on his own person, that these beverages diminished, by at least one-fifth, the amount of carbonic acid exhaled. In 1854, I performed the experiment of collecting the carbonic acid evolved from the lungs of two healthy individuals during one hour; both *before* and *after* administering a dose of alcohol, in the shape of whisky. In the first case, the quantity of gas evolved *previously* to taking the alcohol, was twelve hundred cubic inches; *after* it, nine hundred and fifty only.

In the case of the other person, the quantities were respectively nine hundred and six hundred and twenty cubic inches. These facts show that the presence of alcohol in the circulating current is always associated with a diminished percentage of carbonic acid in the air expired, and in the exhalation from the cutaneous surface. The blood becomes thereby loaded with effete carbon. I analysed, in 1850, the blood of two *delirium tremens* patients. It was, in both instances, deteriorated and deficient in plastic material. The proportion of fatty matters* was, in one case, eighty-six in one thousand parts; in the other, sixty-two. The healthy proportion is, certainly, not higher than ten. Lecanu found in the blood of a sot, the still higher proportion of one hundred and seventeen parts in one thousand. To apply the teachings of these results to the present subject; physiological science and experience alike instruct us, that the state of body the most favourable to the invasion and development of a zymotic aëreal poison, is set up by the presence in the blood of organic matter in a condition of change, of decomposition,—of fermentation, to speak familiarly. This state is readily induced by any agent, introduced from without, which checks the depuration of the blood in the lungs; and retains within it the effete products of its circulation. It is, *par excellence*, the condition of the blood of a drunkard. I shall not attempt here to discuss the much vexed question, as to whether the blood of a moderate habitual drinker is, *pro tanto*, in a similar state. I have no hesitation, however, in urging the following fact, which has received overwhelming proof, that the *least* habitual excess *beyond* a very moderate indulgence in fermented beverages, lowers the vital properties of the blood; destroys the normal tone of the nervous centres; and, as a constant *sequitur*, most powerfully predisposes the frame to the absorption of epidemic virus of whatever kind. Pure aërated blood affords the best safeguard against the attack of any epidemic. But the more perfect system of house ventilation, cleanliness, etc.. will fail to secure this, if, by the constant imbibition of alcohol in excess, the functions of the lungs and skin are interfered with, their healthy relations destroyed, and their waste products retained within the current.

To conclude on this point; experience has quite convinced me, that no other single social cause in operation is more active, or takes a more widely extended share in the diffusion and fatal aggravation of epidemic disease, than intemperance.

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* These fatty compounds are formed from the waste carbon.

### II. FILTH.

What are the courts and back yards of houses in most low neighbourhoods, from the Scottish Highlands to the Land's End, but *parterres* of poison—hotbeds, sown thickly with the seeds of epidemic disease, and abundantly manured for the production of rich and perennial crops? When heavy rain falls on these accumulations of refuse after a long drought, and rapid evaporation by the heat of the sun afterwards takes place, a virus is engendered, which contaminates the surrounding air, spreads far and wide, and secures the fatal harvest of disease and suffering. Personal uncleanliness, owing to its relation with the important functions of the skin, has also much to do with the development of epidemic disease—especially of fevers. It depends, doubtless, in part on the facility of procuring the means of ablution; and might, therefore, with propriety have been discussed under the topic of water-supply. In fact, we find, in reviewing the evils arising from the social habits of the people, that these are in some measure dependant on the external circumstances surrounding them; and that the whole chain of such evils hangs closely together. Thus filth of person and habitation, improvidence, recklessness, and, to some extent, drunkenness and unchastity, are the almost inevitable consequences of bad drainage, foul water, dark and damp hovels. We may, however, draw a consolatory deduction from this truth, viz., that, by *removing* such outward circumstances, we may reasonably hope also to *destroy* the evil habits to which they have given birth.

### III. NEGLECT OF INFANTILE LIFE.

Carelessness, and the most improper management of infantile life, is a terrible and prominent characteristic of the principal manufacturing districts of England; especially of Lancashire, Yorkshire, and Lincolnshire. In pursuance of the eternal law of Nature, wherever we find a very high ratio of mortality, there do we also discover a more than average fecundity of race. In many of the large clothing towns in the north, thousands of infants are yearly brought into the world seemingly for no other purpose than to perish soon after seeing the light, like premature and blighted buds. The impurity of the dwellings in which these innocents are born, and the vitiated air they never change, is doubtless partly chargeable with the appalling mortality which prevails among them. But I wish in this section especially to call attention to causes in operation, which I believe to be yet more efficient in the dif-

fusion of disease and the destruction of life. The detestable practice, of mothers who labour daily in the cotton-factories, leaving their helpless infants (as soon as they are themselves sufficiently recovered from their lyings-in) in the charge of some wretched old crone, who undertakes, perhaps, to "tend" five or six, is very general. Its almost inevitable result is the common adoption of the odious and never-to-be-sufficiently-reprehended practice of dosing the forlorn innocents with "*quietness*"—opium in some form. This horrid custom has already been ably exposed by Dr. Lyon Playfair and others. This narcotism at a tender age, not only *directly* produces brain-disease, scrofula, and other fearful maladies, but also establishes a permanent condition of system, in which the natural power of resistance to the inroads of disease is reduced to its lowest ebb. Hence, among children so circumstanced, an epidemic is almost sure to commit great ravages. But the mischief is not limited even to this. Such of these victims of a detestable and inhuman system as survive childhood, possess, as a consequence, even in adult age, a radical vice of constitution. The result of the present state of things in factories—especially the system of female and infant employment—is the production of a race of beings gradually sinking in the scale of intellectual vigour, virtue, and physical strength. Let any one who deems this an exaggerated and prejudiced statement, visit the manufacturing districts, and judge for himself. Let him enter the mills, and the cottages of the poor operatives; and not be dazzled by the glare of enormous wealth, the specious attraction of cotton-lords' mansions, and the triumphs of machinery. He will then discover what these triumphs have entailed upon us. Instead of benefiting by parental example, and exercising their bodies in the open air, the poor young children are sent at too early an age to the factories; where they have no moral restraint, where self-denial is unknown, and where they grow up slaves to the most degrading passions. In such a community, herded together, the empire of religion and reason gives place to the sway of brutality and sensualism. In fact, if the present condition of factory labour be not in some way amended, if some steps be not taken to rescue a great mass of our population from that abyss of vice, debasement and heathenism into which they are now hurrying, it seems clear, to my humble judgment, that civilization in the manufacturing north will speedily become but a synonyme for refinement of moral depravity; the grand ennobling truths of religion are there losing their hold on the public mind; their fruits are seldom met with;

and (so far as regards the well-being and true enlightenment of the masses) the meridian of our national glory has reached its culminating point, and is already on the wane. In too many instances is a cotton-mill a "whited sepulchre"; outwardly showing evidence of wealth and power, but full of uncleanliness within.

In March and April, 1856, a severe outbreak of *measles* occurred in the district of Hindley (Lancashire). The ratio of mortality was very high, the number of fatal cases being one in four.* This declined and disappeared in May, and was succeeded by an epidemic of *hooping-cough* and *croup*. These were likewise of bad type. Of thirty-two cases of hooping-cough, five proved fatal, from the rapid supervention of pneumonia. Of seven cases of croup, three terminated fatally. Now I noticed (especially with regard to the measles) that nearly all the bad cases occurred among the children of factory operatives. Among other classes the disease was of a comparatively mild type, and ran its course favourably. My own children were early affected, and recovered without any aid from medicine. The worst cases were among the infants of weavers, brought up on *artificial food and opiates*.

### IV. UNHEALTHY OCCUPATIONS.

The "diseases of special occupations" have already attracted much attention. But there are many trades, not usually accounted unhealthy, but which, nevertheless, strongly predispose those persons engaged in them to epidemic disease, owing to the fact of their being carried on too frequently in unhealthy workshops. Tailors, compositors, milliners, etc. are often congregated together for many hours in stifling rooms, heated perhaps during the winter with stoves. Gas-light is justly deemed one of the great blessings and comforts of the present age, but it has its attendant evils, and those of great magnitude. It consumes the vital air much faster than any other artificial mode of illumination, and the products of its combustion are necessarily proportionably great. Even when the gas consumed is perfectly pure (and when is this the case?), the amount of carbonic acid generated speedily becomes sufficient to become highly deleterious, unless every care be taken to insure free ventilation. But it is generally much contaminated with sulphuretted hydrogen, which becomes sulphurous acid when burnt. This is very noxious to health, destroys the

* From a careful analysis of a very large number of cases, during various visitations, I estimate the average mortality as one in fourteen and a half.

appetite, and enfeebles the frame. At some future time I hope to publish some extended observations on the influence of diverse trades on the type of epidemic maladies.

I have now completed this brief sketch of a very important subject. My object has been to show, if possible, that there at present exist a large number of *remediable* causes of epidemic disease. It seems to me clear that *locality* has a far greater influence in inducing and spreading communicable disease than climate or season. There is much popular error on this point. An opinion is even now prevalent that cholera, influenza, scarlet-fever, typhus, etc. are mysterious scourges; "lighting where they list," and obeying no law but the will of an inscrutable Providence. This is a grave error. We have evidence enough to prove to the most sceptical that these fearful visitors are *not* indiscriminate. They affect and cling to the foul region, the overcrowded dwelling, the reeking sewer, the debauched and enfeebled frame. If it be asked, where do epidemics first break out, and where do they make most havoc? The answer, in accordance with an overwhelming amount of statistical evidence would be, "Almost always in dens of filth, and in low, dark and ill-ventilated places. For instance, where did the cholera first break out at St. Petersburgh in 1848? Among the boat population and the low parts adjacent to the river. Where at Dantzic? In mud barges. In Berlin, in 1832? Among the skippers in the boats. In Moscow? In a low, damp quarter, included within a bend of the river. In London, in 1849 and 1854? On the banks of the Thames and near the outlets of sewers. But let not the more affluent inhabitants of towns or rural districts console themselves with the idea that in their more favourable circumstances they are secure from danger. Once allow the demon of contagion to get a footing, and he will not, in the end, be confined to his natural element of filth and misery, but will overstep this boundary, and foray for victims among the families of the upper classes of society.

A word or two in the way of suggesting modes of remedying these bad influences, and I have done. The evils arising from want of ventilation might be partially met by a legislative enactment, insisting on the altitude of rooms in dwelling houses bearing a fixed proportion to their area, and prohibiting the letting of all new houses, until thoroughly inspected. Persons about to build houses should also bear the following sanitary points in mind. 1. *The situation to be dry.* 2. To be as elevated as possible compatibly with shelter. 3. *To be near a pure water supply.* 4. The houses not to be over-

shadowed by trees or taller buildings. But the greater part of the evil, especially that dependant on the social causes, can only be remedied by the gradual process of enlightenment among the people. This is to be effected by patient and quiet instruction. Clergymen might much enlarge their sphere of usefulness by descending occasionally from the pulpit, and lecturing on and enforcing sanitary matters. Medical men, on whom the public so much rely, should diligently teach and induce, by their example, others to teach, that *pure air is as necessary to health as good food;* that the north wind, striving to enter the crevices of a stifling room, is not an enemy to be shunned, but a friend to be welcomed; that a bedroom should always have a fire place in it, and an *un*stopped chimney; *that cesspool and fever are as cause and effect; that the use of foul water, sooner or later, induces disease;* that the blessed sunbeam is as necessary to the full vigour of man as of the plant; *that beer is not strength, nor can afford it;* that however well persons may be off, yet, if their bodies be enfeebled by the bestial vice of habitual intemperance, their prosperity is of no avail in the warding off disease; that the perspiratory tubing of a human being extends over twenty miles, and that a suspension of the functions of the skin is far more disastrous in its consequences than that of the bowels; that innocent children of tender age were not intended by the Creator to work for their bread in dreary rooms, reeking with steam and dust; but to gambol in the glad sunshine, and exercise their limbs in the open air. Finally, that disease is not so much flying about in the air, and hovering in unknown regions, as it is *developed in our homes, and fostered by evil habits.*

This is, *par excellence*, the age of progress, true and essential. And that which unmistakeably stamps this character upon it is the movement of Sanitary Reform. Its ultimate benefit lies far beyond its economy and immediate advantage, though these be very great. It prominently recognises the existence of sympathies and relations between all grades of social life, and that—

"One touch of Nature makes the whole world kin."

## AGUE EPIDEMIC AT CANNINGTON.

By ALFRED HAVILAND, Member of the Royal College of Surgeons, and of the British Meteorological and Epidemiological Societies.

WHEN an epidemic suddenly reappears in a locality which it has not visited for many years, it behoves all, from the physician to the peasant, to meet the foe with a determined front, and join heart and hand in expelling it. In most instances, the extremities of this social chain would have no hesitation in combating the evil, but, unfortunately for humanity, there are links between, which are weakened by ignorance and prejudice, and so it often happens that the warning of the physician is unheeded and the prayer of the poor man is uncared for, whilst a chattering ratepayer is listened to as an oracle, in his attempt to ignore the calamity and its cause, and to prove that foul drains, and paupers debilitated and incapacitated for work by disease, are less expensive to the parish than clean drains and a healthy peasantry.

I mean these to be general remarks—*qui capit, ille facit.*

Cannington is a pretty little village in Somersetshire, situated about three miles north-west from Bridgewater, and about a mile and a quarter south-west from the river Parrett, which limits the alluvial plain, on whose western boundary the lower portion of the village is built; the majority of the houses to the west having for their foundation the red sandstone, and to the north-west the cottages lie upon the mountain limestone, which crops out in a most remarkable manner, forming the hill called Cannington Park. The village itself is sheltered from the north-westerly, the northerly, and the north-easterly winds, by the elevated red sandstone ridge, which rears itself to the north. Cannington gently slopes to its southern boundary,—a beautiful stream of water, derived from the Quantock Hills, and flowing into the Parrett, after forming an important drain for the marsh lands to the north-east. This stream supplies the mills at the higher portion of the village, and is capable of being turned off for the purpose of flushing the main drain. This, however, has never been done. Why?—The parishioners alone can answer. Through the centre of the village is a main drain, in a deplorable state of inefficiency, and a partial drain through the churchyard, which is on gravel, and during wet seasons admits much water, causing great inconvenience at times, after continued rains, to the gravedigger, and much *malaise* in those who drink the water of the neighbouring wells, into which that derived from the churchyard soaks, after leaving the putrescent bodies of its occupants. Nature has been kinder to Cannington than man;

and if her gifts, viz., a beautiful air and a plentiful supply of water, were accepted and appreciated as they ought to be by the recipients of her bounty, this picturesque little village would rank still higher than it already does in the scale of healthiness: as it is, however, a total neglect of all hygienic rules renders its inhabitants liable to several epidemic fevers, which perchance, at no short date, may give them a severer lesson than they yet have had; and then, and I fear not until then, will they look into those matters which so deeply concern themselves and their dependents. The remarkable feature of the present epidemic is its reappearance after an almost entire absence for a great number of years. About thirty or thirty-five years ago, the land around Cannington was badly drained and the ague was quite endemic. Within the last ten or twelve years, however, since the draining of land has been much in vogue, I have found only about one and a half per cent. of the cases admitted at the Cannington Dispensary to be those of ague. I was therefore surprised to find this small number leap up to nineteen per cent., and among the cases of illness occurring in two of the friendly societies, to twenty-nine per cent. I immediately set to work to investigate the cause, and found that not *undrained land*, as heretofore, was the *fons et origo mali*, but *undrained houses*, which the remarkable dryness of the season had assisted in rendering pestiferous. The Committee of Health, which had been formed at my suggestion in the November of 1857, when cholera was anticipated, had confined their labours to a solitary perambulation of the parish, which resulted in not a single nuisance being removed, or even an official order for that purpose given. Then followed a dry winter, and still drier spring; the whole amount of rain for the first six months of this year only reaching 6·70 inches, or less than half the usual average for the same period of the year. The sewage in the main drains and its tributaries, both open and covered, were affected by this unusual drought; it stagnated and fermented in its lazy course, and sent its poisonous gases into the dwellings of all, reminding them of their grievous neglect of duty, both towards themselves and their neighbours.

I have said that I was surprised to find such a sudden increase in the number of ague cases at the dispensary, and my surprise was not lessened when, upon investigation, I discovered the cause of the epidemic, which day by day was being developed.

The beginning of this year had been remarkable for its dryness, although the country in this neighbourhood had not suffered from drought; the crop of hay, although perhaps not so abundant as it would have been had there been more moisture,

was considered good, and gathered in without loss. This harvest was succeeded by a beautiful cereal one; what rain fell did so most opportunely, and gladdened the heart of the farmer sufficiently to make him gratefully acknowledge that so splendid a season had not for many years been remembered; nature seemed to smile upon all around her, and would have spread comfort in the homes of the poorest during this joyful time, had not the bright rays of her sun found out the open and secret haunts of filth and improvidence, and rendered the undrained and unventilated cottage unfit to receive the weary labourer and his family after their toil in the harvest fields of their employers. Truly may it be said that the poor cottager loses within his low and confined dormitory the vigorous health which his occupation during the day would ensure him.

I made a house to house visitation in the village and outskirts of Cannington, and subjoin the result of my inquiry.

In the village and immediate neighbourhood, there have been *ninety-four* certified cases amongst a population not amounting to eight hundred souls. Throughout the year, there have been several stray cases occurring from time to time; August, however, was the month in which the epidemic was at its height, as more than forty persons were then suffering from it at one time. In June and July, the greatest portion of other cases took place. The epidemic seems not to have spared one sex more than another, having attacked exactly an equal number of each, viz., forty-seven. The following statistics will give an accurate idea of the time of life most susceptible of the ague-poison.

| | | | | | |
|---|---|---|---|---|---|
| Between | 1 | and | 10 | years ..... | 21 cases |
| | 10 | „ | 20 | ..... | 25 |
| | 20 | „ | 30 | ..... | 7 |
| | 30 | „ | 40 | ..... | 16 |
| | 40 | „ | 50 | ..... | 7 |
| | 50 | „ | 60 | ..... | 11 |
| | 60 | „ | 70 | ..... | 4 |
| | 70 | „ | 80 | ..... | 2 |
| | 80 | „ | 90 | ..... | 1 |
| | | | | | —94 |

From these numbers, it will be at once evident that more than three-fourths of the persons affected were capable, on account of their age, of earning wages in an agricultural district.

Above forty persons were laid up in consequence of the ague for more than a month, and many of these had the disease paralysing their strength for two, three, and four months consecutively. The number of cases in each district is as follows:—

No. 1 District. *Nine* cases from the New-road to Oatley; the cottages scattered; some have drains which receive the cottage and the pigsty sewage and have no eject, not even a

cesspool. These open receptacles of filth are situated in front of the dwellings, so that the effluvium, which in calm days and nights is described as dreadful, has every opportunity of invading the cottage to which it belongs or the neighbouring one.

No. 2. *Twenty-two* cases in Hornhill, an undulating and elevated locality, on the red sandstone, circumstanced like the latter district with regard to drainage: the cottages, however, are more overcrowded. Pigsties prevalent; in many instances, the pig-soil allowed to accumulate near the water source, and the children in the habit of "going anywhere." Dormitories low, and the windows of the upper rooms near the floor; seldom any fireplaces in the bedrooms.

No. 3. *Fifteen cases.* Cannington-park, Limekiln-lane from Knap to Putnill, elevated and undulating ground, nearly entirely on mountain limestone. The cottages and their drainage exactly similar to the last.

No. 4. *Fifteen cases,* Rodway Hill. On the red sandstone, the north side low and adjoining the marsh; ditches full of stagnant sewage from Rodway farmhouse and adjoining cottages. Accumulated pig's wash and filthy pigsties. The houses on the more elevated portion surrounded by nuisances.

No. 5. *Thirteen cases* in Frog-street, at the bottom of which the drains come to a stand still. The situation is low, on the alluvium, and adjoins the marsh lands.

No. 6 includes the central portion of the village, which gradually rises from the last district, and lies upon the red sandstone and gravel. The number of cases was as follows:—Hennet's-buildings, *one;* Main-street, *seven;* Chit's-lane, *six;* Church-street, *one;* and other places, *five* cases—making in all, with those in other parts, *ninety-four* cases.

The epidemic is happily now on the decline, but relapses are frequent, the same causes still remaining: in consequence of my calling public attention to the above facts, a public meeting was called at the church, the committee of health was requested to resume its duties and carry out my suggestions, viz., to turn the mill stream through the main drain once a week, on Sundays, enlarge the tributary drains, cover those which are now open, and enjoin a periodical simultaneous pumping, so as to wash out the accumulated filth of ages. Up to the present date, not a single step has been taken either publicly or privately to abate the nuisance and remove the cause of disease. The medical man is powerless; he may advise, he may forewarn, but like Cassandra, his prophetic voice is seldom heeded until too late.

# SANITARY AND SOCIAL SCIENCE.

## REPORTS OF CITIES, TOWNS, AND DISTRICTS.

### CONSTANTINOPLE.

By R. F. FOOTE, M.D., Member of the Imperial Medical Society of Constantinople.

WHEN as residents we visit the various parts of this great city, Constantinople, standing as it does a link between civilisation and barbarism ; where the Divine nature has done so much and the human nature so little ; two questions of importance present themselves to us as physicians ; viz., the condition of its population in regard to health ; and the peculiar effects of disease upon the population. We will consider, therefore, *seriatim*,

1. The climate and diseases of Constantinople, with the hygienic arrangements of the city.

2. The predisposing causes of disease and the amount of mortality.

3. The diseases prevailing and the means to prevent them.

The town of Constantinople, placed upon seven hills at the entrance of the Bosphorus, in very close proximity to the Marmora, and not twenty miles distant from the Black Sea, has, in and around it, a good climate, a picturesque neighbourhood, a light soil, a fine harbour, and a population from every part of the habitable globe,—speaking all languages, from Russian to Hindoostanee, from Italian to Circassian,—while wood and water, hill and lake, may all be said to be happily blended in and near this much coveted city. Situate in this position, the wind constantly blows from north to south, or in the contrary direction ; all offensive material rapidly passes off in one course or the other.

There are no large towns above on the banks of the Golden Horn, whereby the collection of sewerage is sent down to infect the air, as we find in some towns of Europe. There are no large factories in its neighbourhood, engendering the worst forms of disease, not only physically on its population, but morally by their associations ; no stagnant salt marshes are in its neighbourhood to taint the water.

The town of Constantinople has hitherto, however, been considered an unhealthy city ; and, on examination of its streets, alleys, houses, means for supplying water, drainage, and cemeteries, this view will be but little altered. During the months of December, January, February, and March, many of its principal streets are impassable ; thus, if we take the line

of road from the English or Russian embassies to the Sublime Porte, a distance of perhaps two miles, we shall find that the streets will not admit of passage for waggons, carts, carriages, or other mechanical contrivances which the *genus homo*, as a rule in England, France, and America applies, to assist him in transporting the products of his own country to the sea for exportation, and to import those of other lands for his own use.

A combination of the level, inclined plane, lever, wheel and axle, are agencies which appear, as a rule, to be disregarded by the inhabitants of Constantinople.

To the Mussulman, as the ruler of the country, we must alone look as the person with whom to make arrangements, who will direct and enable others to put their powerful agents in motion. He is the person to form roads, the great arteries of the country, and keep those roads in a proper state of efficiency.

In examining the houses, we find that all the sanitary rules, generally considered of the utmost importance, are disregarded; that the dwellings are badly constructed as protectors against the cold and rain of winter, and are equally inefficient against the heat of the sun in summer; outside each door there is generally a heap of refuse, animal and vegetable, to be removed by the dogs, the only scavengers; or by the rains, which not frequently occur. The supply of water is very defective and insufficient, particularly during the summer, in Pera and Galata.

The mode of heating houses is by open charcoal fires, or, as they are termed, "mongals"; not an uncommon cause of death, I believe, particularly in Stamboul, where there are no means of producing heat by any other method.

The apartments are over crowded; and among the Christian population, several members of a family live and sleep in one room; numerous families inhabit one house, and at night they lie down in their day clothing.

There is no regular system of drainage; large cesspools are frequently observed near the houses, and the water-closet, or privy, is generally placed on the ground-floor beneath the living room.

With all these deficiencies, we are bound to consider Constantinople an average healthy city, a result due to a greater extent from its climate, than to any of the hygienic precautions practised by its inhabitants.

The same state exists at the various towns on the Black Sea; and where the natural conditions are imperfect, consider-

able amount of disease is always present; thus at Batoum and Sampson, there is always some form of fever.

However, in the midst of this city, gardens filled with luxuriant trees may be everywhere seen.

The vast amount of charcoal constantly consumed in the capital tends to assist more rapid decomposition, and to deprive the air of the various noxious principles; for the atmosphere has always an elasticity, a purity, and an exhilarating influence, which we have not witnessed in any other country. The absence of watery vapour in the atmosphere is proverbial in many parts of Pera, Stamboul, and the villages of the Bosphorus; this purity, we believe, is due to the amount of (ozone) electrical influence constantly present. Whatever may be the natural advantages, the artificial arrangements for health are extremely bad. The charcoal and ozone prevent the existence in a graver form of the various contagious diseases.

Although the baths in some parts of the city exhibit a style of architecture only equalled by the mosques and other public buildings, and their internal regulations and economy are very good, affording cleanliness at any time to the poorest inhabitants at a very low rate, yet we are inclined to believe, that the artificial heat acting on the epidermis tends much to cause the shrivelled countenance, and the premature appearance of old age, which are seen in the Eastern as compared with the Western peoples.

The value of baths as hygienic agents must be rather compared with the long and continued fasts of the Greeks and Armenians, and the daily abstinence during Ramazan of the Mussulman, together with the indulgence commonly practised. At other times, the inhabitants seldom change their body linen, and have a great horror of cold water, except to their faces, hands, and feet, as a daily custom.

Bleeding is performed here on each individual, with the same punctuality as bathing; and, no doubt, the nervous tone and energy is materially lowered by the custom of the inhabitants to submit themselves three or four times in each year to lose perhaps sixteen or twenty ounces of blood.

To the absence of a large quantity of nitrogenised food, to the use of olive oil as a regular article of diet, to the avoidance of exposure after dark to the falling dew, to the care of clothing themselves warmly, may be due the absence of many diseases. Pulmonary consumption, vesical calculi, and delirium tremens, are rare diseases among the population.

The practice of drinking strong decoction of coffee before

going out in the morning, may be considered as a proper precaution against intermittent fever.

For a long time it has been found difficult to obtain any statistics as to the amount of disease, from the existence of so many communities represented by the different forms of religion, over which the chiefs watch with jealousy. The endeavour to procure any information is always difficult. In the absence of any published statistics by the Ottoman government, we take those by Mr. Kquesnel, who, in his *Essay on the Movement of the Population of Constantinople*, states—after making the calculation from the consumption of bread, meat, and other *parts*, collected by M. Verrolot—that the population of Constantinople, in 1848, consisted of 715,300; comprising the residents, the military, marines, the population passing between Constantinople, the suburbs, the Islands of Princes, and the chateau of the Seven Towers.

The resident families in 1848, figure as 557,000 souls; the Mussulmans figure as 340,000, or more than three-fifths of the whole population; the Rayas as 217,000.

The families thus contain 270,000 individuals of the male sex, and 286,160 of the female; this gives a return of 100 women for 94·6 men.

Among the Jews, the number of females surpasses that of the males by one-seventh. A preponderance is observed, but in a less proportion, among the Greeks and Catholics.

The Mussulmans and Armenians are those only among whom a larger number of males is represented than of females, viz., as 107 to 100; but the proportion is different when we include the slaves. We find 162,500 males for 177,500 females, which gives a percentage of 100 females for 91·5 males.

M. Verrolot states that it is in June, July, and August there is the highest rate of mortality, and in September, October, and November, the lowest.

The greatest number of births take place in January and February, instead of in September, November, and March.

Whatever may be the numerous causes which tend to affect the public health, it is not the less true, that it is more flourishing at Constantinople than in any large towns of Europe.

We are led to believe that the actual number of deaths, is one in 41 for the entire population, civil and military; this is nearly half that which has been observed at Vienna, and three-fourths of the mean mortality of the towns of Naples, Leghorn, Palermo, and Barcelona. This low mortality, he says, I ascribe:

1. To the salubrity of the climate.

2. The spreading of the population over a vast surface.
3. The vigorous constitutions of its inhabitants.
4. The vast number of unmarried females constantly being imported.
5. A simple regimen accompanied by great sobriety.
6. The absence of the higher intellectual occupations.
7. The non-existence of the miserable class of persons exhausted by excessive work; a miserable race which affect all the grand centres of industry.

The cause predisposing to disease among Europeans recently arriving in this city, is that of preserving the same regimen to which they were accustomed when living in their own climate.

The daily use of the same amount of nitrogenised food and carbonised drinks, I look upon as the chief causes of maladies in new comers to this country.

Take, for instance, a marine who has been accustomed to laborious exercise on board ship, stopping suddenly in the harbour of Constantinople; he is not at all acquainted with the fact, that it is necessary for him to take less food than he has been accustomed to; if anything, he takes more, because he receives fresh meat and vegetables, from which, for a longer or a shorter period, he has been deprived; he eats as much or more than usual; he has an attack of diarrhœa, congestion of the liver, or fever. Take, on the other hand, an European traveller, arriving at one of the principal hotels, fatigued with his journey, annoyed at his passage from Tophané to Pera; he indulges in three glasses of sherry, on the oily meats of the table, and after a few days he suffers from lassitude, from pain in the head, with constipation; or, on the other hand, he may have a dangerous attack of diarrhœa, or even continued fever. He immediately fancies this is a very unhealthy climate; whereas the disease ought really to be placed to his own imprudence, or to the neglect of his medical advisers, in not informing him of the necessity for abstinence on his arrival.

I have been repeatedly called to patients who fancied that they were suffering from some very serious malady; when, on the administration of a mild mercurial at night, followed by some slight aperient in the morning, in two days all the urgent symptoms rapidly disappeared, and the patient has soon felt himself perfectly able to walk to St. Sophia, or the New Palace of the Sultan, and receive benefit from the exercise.

## SEWAGE AND SEWER GASES.

[From Dr. LETHEBY'S *Report to the Commissioners of Sewers of the City of London*, on Tuesday, September 14th, 1858.]

IN the present article, we shall give in his own words all the more important facts recorded by Dr. Letheby in his report. The subject discussed, as one of great interest at the present time, could not have been more happily expounded for the people than in the paper from which we copy.

"THE NATURE OF SEWAGE. The matters to be dealt with in the public sewers of every town and city are very complex, for they are composed not only of the solid and liquid ejecta of the population, but also of the fluid refuse of every branch of industry. They consist of the filth of kitchens, laundries, and dye-houses; the drainings from stables, slaughter-houses, and the public markets; the various liquid impurities of trade and manufactures; and the washings of the streets and alleys: all of which, with the ejecta of the inhabitants, and a large quantity of water, compose the sewage of towns. Each of these constituents, however, has its influence on the composition of the general mass, and on the putrefaction to which it is liable. Every part of a city, therefore, has its own peculiar quality of sewage—the quality being affected by the density of the population; the habits of the people, as to their diet, cleanliness, and trade pursuits; by the season of the year; the day of the week; the hour of the day; and even the state of the weather. This makes it difficult to obtain precise information of the nature and composition of sewage. Nevertheless, there are two ways by which a knowledge of the subject may be approached, viz., by the synthetical method of ascertaining the average amount of solid and liquid matter contributed by each of the inhabitants; and, secondly, by the analytical process of examining the sewage at different places, and at different times and seasons. Both of these plans of research are, no doubt, open to objection, but still they give results which are sufficiently accurate for our present purpose.

"The first method of inquiry has been pursued by Mr. Lawes, and by Professor Way; and the results of their investigations are that from 2 to $2\frac{1}{4}$ ounces of dry solid matter are contained in the excrements, *per diem*, of each member of the population. In the moist state as they are discharged from the body, they amount to about forty ounces *per diem*. These give a daily total of 152·6 tons of dry matter, or 2993·6 of moist, for the excrements of the whole population of London at the present time. But, while on the one hand, the ejecta are not entirely discharged into the sewers, so on the other, the numbers take no account of the contributions from trade, or of the washings from streets. I am not acquainted with any data for the estimation of the first of these, but the second may be ascertained approximatively from the analytical results of

Professor Way. He has found that the rain-water which runs from the streets into the gullies after a heavy shower of rain, contains about 262·6 grains of solid matter per gallon, of which 113·34 are in solution, and 149·26 in suspension. In the case of the granite roads, where the traffic is very large, the total amount of solid matter is 813·33 grains per gallon, of which 276·23 are dissolved, and 537·1 suspended; and in that of the wood pavements with the same kind of traffic, the amount is only 39 grains per gallon, of which 34 are dissolved, and 5 suspended. It will be manifest from this, that a large quantity of solid matter is carried from the streets into the public sewers during heavy rains. Altogether, it may be said, that the ejecta of the inhabitants of this metropolis, and the washings of the streets daily furnish about 233 tons of solid matter to the sewage; and these, with the trade refuse, are diluted with about 84¾ million gallons of water.

"The second mode of estimating the composition of sewage is founded on the analytical results of its examination at different times and places. These results show that the sewage which is discharged by day from the city sewers, contains about 94 grains of solid matter per gallon, of which 38 are suspended, and 56 dissolved: of the suspended, 17 are organic, and 21 mineral; and of the dissolved, 15 are organic and 41 mineral. The night sewage is not so rich in solid elements, for it contains only about 79 grains of solid matter per gallon; of which 14 are suspended, and 65 dissolved; and of these 15 are organic, and 64 mineral, the organic being distributed very evenly between the soluble and insoluble constituents.

"The sewage of the Tower Dock sewer contains by far the largest proportion of solid matter. A gallon of it furnishes about 921 grains of solid impurity; of which about 890 grains are in solution. The chief constituent is common salt,—a trade refuse of the neighbouring fishmongers. That which has the least impurity is the sewage which flows into the Whitefriars Dock, for it contains only about 41 grains of solid matter per gallon; of which 14·5 are suspended, and 26·5 dissolved.

"Branch sewers, and those which are nearly stagnant, are generally very foul; for the sewage of them contains from 150 to 500 grains of solid matter per gallon; of which from 90 to 250 are suspended. The organic matter ranges from 20 to 120 grains in the soluble part, and from 20 to 176 in the insoluble.

"Taking the average of all the results obtained in the examination of the metropolitan sewers, it may be concluded that the sewage which flows into the Thames contains about 90¼ grains of solid matter in the gallon; of which about 29¾ are suspended, and 60½ dissolved: there being about 15 grains of organic matter in each of these constituents.

"As I have already said, a storm of rain does not diminish the proportion of solid matter; for although it has a tendency to dilute the sewage, yet it washes away so large a quantity of filth from the streets, and disturbs so much of the sediment in the stagnant

sewers, that sewage after a storm generally contains more than the average proportion of solid matter. Taking 88 grains per gallon as the usual amount in some of the sewers, it will, after a storm, be increased to 125 grains per gallon; of which 64 will be suspended, and 61 dissolved. So that the quantity of filth removed by a heavy fall of rain is enormous.

"The mineral constituents of sewer water are chiefly carbonate of lime and common salt, with small proportions of the alkaline sulphates and phosphates. They are derived from urine and from the water supply. The mineral part of the insoluble matter consists almost entirely of the debris of the streets, and the detritus of wheels and horse-shoes. These amount to about 15 grains per gallon; which, in the aggregate, is as nearly as possible 81 tons per day for the whole of the metropolis, or 19 for the city. I am not able to apportion the several constituents of the 116·61 tons of solid matters daily discharged from the city sewers; for there is a difficulty in ascertaining the precise extent of the area drained, and the number of the population; but by taking the whole of the metropolis, the difficulty disappears. Then, of the total amount of 488·5 tons of solid matter contained in the sewage of one day, about 152·60 tons are the ejecta of the inhabitants; 81·08 tons, the pulverized granite and iron from traffic on the roads; 102·04, the saline matter contained in the water supply; and the residue, 152·78 tons, is from trade and manufactures. The total amount of organic matter in all this is about 215·14 tons; of which half is in a state of solution, and the rest is suspended.

"The physical properties of sewage are peculiar, for when it is examined under the microscope, it is found that the clear supernatant part contains a large quantity of amorphous organic matter, with the filaments of various fungi. It swarms with animal life, as beaded *Spirulina*, *Vibriones*, and *Monads;* and soon after exposure to air the higher forms of infusoria appear, as, *Paramecium*, *Vorticella*, *Rotifera*, etc. Besides which, it contains small particles of animal and vegetable tissues, as the fibres of cotton, wool, etc.

"The sediment, which is black and glutinous, consists of the remains of undigested food, as muscular fibre, husk and hair of wheat, the cells and starch of potatoe, and the tissues of cabbage, and other vegetables. It also contains the products of some of the secretions, as yellow biliary matter, intestinal mucus, and the crystals of uric acid and triple phosphate from urine. As in the last case, the living animal forms are numerous; and the vegetable growths are *Oscillatoria*, *Conferva*, *Vegetable spores*, and numerous *Fungi*. The mineral part is composed of the *débris* of the streets, as particles of granite, flint, and carbonate of lime, with a large quantity of black sulphuret of iron. When the sewage has a very unpleasant odour, and is charged with sulphuretted hydrogen, it never exhibits much sign of animal or vegetable life, notwithstanding that it contans an abundance of decaying organic matter. This

is the case with the foul contents of the nearly stagnant sewers. But when it is diluted with water, and exposed freely to the air, the bad odour soon disappears, and the higher forms of infusoria are rapidly developed. This is proof of the salutary influence of air and water in promoting the less hurtful kinds of decay. I have noticed the same fact on many occasions, when too large a quantity of sewage has been discharged into a running stream. The insoluble matters settle, and do not obtain a sufficient supply of air or fresh water, to check the putrefactive decomposition, which goes on with great activity: an abundance of foul gas is thus generated, and little or no organic life appears. This happens to the black muddy water on the banks of the Thames, where the only living things are *Monads*, *Vibriones* and *Fungi*. But in the middle of the stream the air and water have so completely destroyed the foul gases, that the highest species of infusoria abound; and the same thing may be observed in every river that receives the sullage of a large town. At first, when the sewage enters the stream, it contains nothing of vegetable life but the simplest fungi, then come higher forms of vegetation, as *Conferva*, *Calothrix nivea*, *Vaucheria*, etc., the last being known by its dirty brown colour and short hair-like structure. Soon after this, as the process of oxydation goes on, and the excess of organic matter is destroyed, higher and higher forms of vegetation appear, and at last the *Anacharis*, *Nasturtium*, *Veronica*, and other aquatic plants abound; and when these are clean and healthy, the sewage is no longer injurious to animal life, for fish will thrive in it.

"The Putrefactive Decomposition of Sewage.—Looking at the enormous quantity of organic matter contained in sewage, it is not surprising that its decomposition is attended with the evolution of a large amount of noxious gas; and when we consider that it is composed of organic matters which have just lost their vitality, and are exceedingly prone to decay; that the solid constituents of it are in a finely divided state, and are therefore in the best form for chemical change; that the proportion of water is just sufficient to hold them in a state of suspension; that the temperature of the sewers is exactly suited for putrefaction; and above all, that the complex mixture is brought into contact with matter already in a state of active decomposition, it is not remarkable that it should at once take on the putrefactive change, and begin to evolve foul gases directly it enters the sewers. Under ordinary circumstances the solid excrements do not ferment in less than three or four days, but here the catalytic influences are so strong that putrefaction begins at once, and it is always of the same kind as that already in progress in the old sewer matter. This tendency to accelerate and direct the decomposition is very remarkable. Its power lasts for weeks after the sewage has ceased to ferment, or it will operate immediately on all kinds of organic substances. Blood, sugar, fæces, urine, and other fermentable bodies, are rapidly changed by it; and they evolve com-

pounds of a most offensive character. Common sugar, instead of being fermented into alcohol, is converted into lactic acid, which smells like putrid pigs'-wash: then it passes into butyric acid, and gives off hydrogen and carbonic acid, with the odour of rancid butter and human perspiration. The same thing occurs to other vegetable matters that are susceptible of change into sugar; and although they do not contain nitrogen, or sulphur, or phosphorus, which are the usual stink-producing elements, yet they evolve compounds that are in the highest degree offensive. Albuminous matters produce ammonia, carbonic acid, and sulphuretted hydrogen, all of which are found in the atmosphere of sewers. But besides these there are many intermediate products of decay which have not been fully investigated; and little is known of the part played by atmospheric air in the sewers beyond this, that when oxygen intervenes in the molecular movements, it gives birth to mineral products, as water, carbonic acid, the sulphates, phosphates, and nitrates, which are the final products of decay. Its influence, therefore, is most salutary, and ought not to be disregarded. Experiment has also shown that the oxydising power of the air is promoted by water, by porous substances, and by the fixed alkalies.

"In seeking to know what part of the sewage it is which undergoes decomposition, I have ascertained that it is not the liquid part which continues to ferment, but the solid, and keeps up the putrefactive action for months, evolving large quantities of ammonia, sulphuretted hydrogen, marsh gas, and carbonic acid. It is the sedimentary matter, therefore, which is the chief cause of the offensive effluvium, and to this I shall direct attention hereafter.

"The Nature of the Sewer Gases.—This part of the inquiry is of great importance; for very little can be really done in the way of providing a remedy for the sewer miasms, until something is definitely known of their nature and composition. Hitherto this subject has been treated quite empirically; and the suggestions which have been made from time to time for ventilating the sewers, and destroying the foul gases, have had no foundation in a right knowledge of the things to be dealt with. The history, therefore, of these schemes is a history of unprofitable failures, and is of no practical value, beyond that of informing us what cannot be accomplished.

"I have endeavoured to procure the knowledge which is wanted from three sets of investigations, viz.:—1st, from inquiries into the composition of the gases dissolved in sewage; 2nd, from an analysis of the gases evolved during its putrefaction; and 3rd, from an examination of the sewer air itself. Each of these modes of investigation has furnished valuable results.

"1st. If the clear liquor of sewage is heated to the boiling point, it evolves all the gases which were in solution. They consist of carbonic acid, sulphuretted hydrogen, ammonia, marsh gas, and nitrogen. The quantity of them varies from about 32 to

76 cubic inches per gallon; and the proportion of carbonic acid varies from 36 to 72 per cent.; the sulphuretted hydrogen from 0·9 to 3·1. Thames water, near to the shore at low tide, contains the same gases in nearly the same proportions.

"2nd. While the insoluble part of sewage is fermenting, it gives off a large quantity of gas, the amount of which is influenced by the proportion of organic matter in the deposit. In the case of one of the worst of the city sewers, where the sewage contained 128·8 grains of organic matter per gallon, the quantity of gas evolved during the first week of putrefactive decomposition amounted to 3 cubic inches per hour. From that time to the end of the third week, it amounted to 1·56 cubic inch per hour; and so it gradually fell until the end of the ninth week, when the quantity was only 0·17 per hour. The average of the whole time was about 1·2 cubic inches per hour; and, as in the last case, the gases were composed of carbonic acid, carburetted hydrogen, ammonia, sulphuretted hydrogen, and azote—the proportions being about 72 per cent. of light carburetted hydrogen, 17·7 of carbonic acid, 10·2 of nitrogen, and 0·08 of sulphuretted hydrogen, with a notable proportion of ammonia.

"In my visits to the city sewers, I have remarked that the same gases are abundantly evolved whereever the sewage becomes stagnant or nearly so. The thick slushy matter in the sewer of Catherine-wheel Alley, for example, furnished me with a large supply of gas. It was bubbling up from the deposit; and was so highly charged with light carburetted hydrogen that it could be ignited with ease; and in the act of burning, it would frequently set fire to the neighbouring bubbles, and produce a sheet of flame that would extend for some distance along the surface of the sewage. The gas contained 68 per cent. of inflammable air, 17·6 of carbonic acid, 14·1 of nitrogen, and 0·2 of sulphuretted hydrogen.

"Large quantities of gas are also generated in the sewage deposit which has been deodorized with lime. This is noticed in the subsiding tanks of the works at Tottenham and Leicester; but, in this case, the gas is composed almost entirely of light carburetted hydrogen, there being but little carbonic acid, and not a trace of sulphuretted hydrogen.

"The amount of ammonia contained in the liquid is always considerable. It ranges from 3 to 15 grains in the gallon of ordinary sewage, and from 15 to 41 in that of the nearly stagnant sewers.

"In addition to all these there are other volatile compounds which have not yet been isolated—compounds which give to the sewage its peculiar odour, and perhaps also its poisonous action. One of them is evidently of an alkaline nature, and is nearly allied to ammonia. It is easily procured by distilling the liquid; and its properties are highly offensive. Dr. Odling has examined it, and has noticed that it contains a large amount of carbon. My own analyses, like his, have given with the impure muriatic salt about 6·61 per cent. of carbon; and the platinum compound about

41·73 per cent. of metal. Dr. Odling thinks it may be the conjugate body *ethylamine;* but it is rather premature to speculate on its nature, before there is some certain knowledge of its composition.

"3rd. The analyses which I have made of the atmosphere of the city sewers, show that the air is deficient in oxygen; and that it contains an excess of nitrogen, carbonic acid, and ammonia. The proportion of sulphuretted hydrogen is rarely so large as to be discoverable in definite quantity; for although I have never failed to recognise its presence, yet the amount of it could not generally have been greater than one part in 60,000 of the air. Marsh gas is also present in minute quantity; and there are also organic compounds, which, as I have said, have not yet been isolated. Their existence is known by the formation of water and carbonic acid, when the air, completely deprived of these matters, is passed through an ignited tube filled with metallic copper. The quantities of the products vary considerably, but they are never such as to indicate the same proportions of carbon and hydrogen as are found in marsh gas.

"By another mode of proceeding, I have been able to condense the organic vapour from the sewer atmosphere, and obtain it in a liquid form. A glass globe filled with ice, was suspended from the crown of a sewer, and the cold thus produced has, in the course of a few hours, caused the condensation of aqueous vapour, and with it the organic matter contained in the atmosphere. In this way, on three separate occasions, I have obtained from 1½ ounces to 4 ounces of liquid, the properties of which were as follows. It had a turbid appearance, and contained minute flocculi of organic matter. Its odour was very disagreeable, like that of bad sewage. Its re-action was alkaline; and it contained free ammonia, with a large quantity of sulphate of ammonia,—a compound derived from the oxydation of sulphuretted hydrogen. Nitrate of silver, and chloride of gold, were quickly reduced by it; and a drop of sulphuric acid added to the liquid and evaporated, gave a black organic residue. All these are proofs of its containing organic matter.

"When the flocculi were examined under the microscope, they were found to be composed of amorphous organic debris, with myriads of *Vibriones* and *Monads.* There were also present the higher forms of infusoria, as *Spirulina, Vorticella, Paramecium,* etc., with the ovules of vegetables, and the filaments of *Fungi* and *Conferva.*

"Parent-Duchâtelet collected the condensed water from the sewers of Paris, and he also found that the liquid had a peculiarly faint odour, and an alkaline re-action; and that on allowing it to stand, it quickly began to putrify.

"These results prove that the atmosphere of the sewers is charged with decomposing organic matter, and with the germs of living organisms. It is also deficient of oxygen, and contains an

undue proportion of carbonic acid, nitrogen, and ammonia, with a notable quantity of sulphuretted hydrogen. In the case of the city sewers, these gases are not present in very large quantity; but they may accumulate to a dangerous extent, as sometimes happens in the air of stagnant sewers. When, for example, the sewers of Amelot, De la Roquette, Saint Martin, and others of Paris, were cleansed in 1826, they were found to be highly charged with these foul gases, as with from 0·2 to 1·2 per cent. of sulphuretted hydrogen, and from 0·5 to 3·4 per cent. of carbonic acid; and the fatal accidents which have occurred in the sewers of this metropolis are a sufficient proof of it.

"Properties of the Sewer Gases, and their Effects on the Animal System.—It is hardly possible to form a correct opinion of the injurious qualities of the sewer miasms without a previous acquaintance with the properties of the individual constituents; and foremost in the rank of these is *sulphuretted hydrogen.* This gas is constantly produced during the putrefactive decomposition of sewage. It is known by its peculiar odour, which is sufficient to discover it, when it is diluted with 10,000 times its bulk of air. The gas is a little heavier than atmospheric air, in the proportion of 1,179 to 1,000; but its diffusive power is so great that the increase of weight has little or no influence in making it occupy a low level. In a pure state it is highly combustible, and burns with a pale blue flame,—the products of combustion having the odour of burning sulphur. When it is diffused through atmospheric air, it may form an explosive mixture: and if the proportion of air is less than $7\frac{1}{2}$ times the bulk of the gas, the hydrogen only is burnt, and the sulphur is set free; but if there is a larger supply of air, as from 8 to 9 times its bulk, then it is completely consumed, and it forms aqueous vapour and sulphurous acid.

"Water and the fixed alkalies absorb it freely; in fact the latter take it up in large quantity, and render it comparatively innocuous, Chlorine and chloride of lime destroy it by combining with the hydrogen and setting free the sulphur. Almost all the common metals are discoloured by it; indeed, the salts of lead and silver are so quickly blackened, and are so sensitive of its action, that they indicate the presence of the gas when the atmosphere does not contain more than one part in about 100,000: these, therefore, are the tests for it.

"Sulphuretted hydrogen is exceedingly poisonous; it will destroy life under all circumstances, whether the gas is inhaled, or absorbed through the skin, or injected into the cavities and tissues. Dupuytren and Thenard have found that one part of the gas in 1500 of air will kill small birds immediately, and that one in 290 is fatal to rabbits and dogs in a few minutes. Horses are killed by an atmosphere containing one part of it in 250 of air; but much less is hurtful if it is breathed for any length of time.

"Dr. Barker in his recent inquiries into the action of this gas on the animal system, has ascertained that one part of it in 1800 of

of air, is immediately fatal to birds, and that so small a quantity as one in 2112 of air will sometimes kill them in about a minute and a half. Larger animals are not so easily affected, although dogs are quickly killed by a mixture containing one part of the gas in 210 of air, and more slowly by one in 500. My own experiments are to the same effect, for I have found that one part of gas in 500 of air is soon fatal to rabbits; and I have no doubt from the energy of its action that such a proportion would be highly dangerous to all classes of animals. These facts make it difficult to understand the accounts given by Parent-Duchâtelet and others, of the thriving of rats and mice in sewers, which have an atmosphere composed of from one to two per cent. of the gas; and I am inclined to think that the means which were at the disposal of his colleague, Gaultier de Claubry who examined the air, were not sufficient to determine the actual proportion of the mephitic gas.

"Observation has likewise shown that when the gas is diluted with very large quantities of atmospheric air, its action is slowly but surely deleterious. Of this, there are many examples. When the men were engaged in cutting through the bed of the river, for the construction of the Thames Tunnel, they suffered severely from the effects of the gas, although the proportion of it in the air was hardly to be discovered by lead-paper, and could not, therefore, have exceeded one part in 100,000. It is true that it sometimes came in gushes from the fissures of the mud, but the quantity was rarely sufficient to be recognisable by its odour. Strong and robust men were, however, reduced to a state of extreme exhaustion, by breathing it for a few months; and several of them died from it. The symptoms with which they were affected were giddiness, nausea, or actual sickness, and great debility. The men became emaciated, lost their appetites, and fell into a state of low fever, from which, in several instances, they did not recover. Chloride of lime, and other prophylactics, were used; but the evil did not entirely cease until the tunnel was opened from end to end, and free ventilation established.

"According to Dr. Taylor, another remarkable instance of the same kind of poisoning occurred last summer at Clayton Moor, near Whitehaven, where there is a row of small cottages built on the refuse slag of some neighbouring iron-furnaces. The houses are occupied by the workmen and their families, who, for some time, had been annoyed by an offensive smell, which pervaded the lower rooms. Suddenly, however, in the month of June of last year, the smell became unusually offensive; and, in the course of two days, thirty of the inhabitants were made seriously ill by it. The attack was remarkably sudden, as if a poison had been at work. In one of the houses there was a family of seven persons, consisting of the husband and wife, and five children. They retired to rest in their usual health, but in the morning two of them were dead, and the others were in a state of profound insensibility. Before the day was over, another of them died, and in the course

of the week a fourth. In a second case, a strong, healthy man came home from his night-work, and went to bed; but an hour had hardly elapsed, when he also was found dead. And in a sixth instance, a child was taken ill in the morning, aud was a corpse at night. An inquiry was instituted for the purpose of discovering the cause of the mischief, and Dr. Taylor came to the conclusion that it was sulphuretted hydrogen, generated by the action of water on the refuse slag, upon which the houses were built. If so, it is a remarkable instance of the poisonous action of this gas; for those who examined the air of the rooms declare that the test of lead-paper failed to show the presence of the poison, except in mere traces—that is, in quantities which could not have been greater than 1 part in 100,000 of air; for such a proportion would have been easily recognised if it had been present. It is unfortunate that an ultimate analysis of the air was not made, for that might have proved the existence of some other gas, perhaps carbonic oxide, which is largely produced in the furnaces, and which might have been wafted from them to the bed-rooms. Those who survived the action of the poison, declared that they were suddenly attacked with giddiness and insensibility; and this was followed by a death-like coma. In some cases there were nausea and vomiting, and in others there was a feeling of oppression and closeness in the air.

"These experiments and observations show that sulphuretted hydrogen gas is a powerful narcotic poison; that in a concentrated state it kills immediately, as with the energy of prussic acid. In a more dilute form it causes death by lingering stupor; and when more diluted still, so as hardly to be discovered by its odour, it prostrates the vital powers, and produces a low fever which may end fatally. Dr. Barker, in his prize essay, has summed up his observations of the effects of the gas in these words:—"The symptoms arising from sulphuretted hydrogen are well marked, and may be considered specific. Vomiting and diarrhœa are the first and most prominent symptoms. The latter is painful; the vomiting is difficult and exhausting; and eventually there is insensibility and entire prostration. When the dose of the poison is at first very large, the prostration and insensibility are immediate. The pathology following such poisoning is also definite. If the death take place quickly, the pathological evidence is that of asphyxia. If the poison is long breathed in a diluted dose, the pathology is modified; the fibrine of the blood is separated, and the heart is slowly clogged up with fibrinous depositions."

"*Carbonic acid* is also produced by the decay of organic matters. It is found in the air of sewers to the extent of 0·5 to 2·3 per cent.; and the gases evolved from the sewage itself contain about 19 per cent. of it.

"This gas is not easily recognised by its sensible properties, for it has no distinct odour, unless it is breathed in a very concentrated state, and then it irritates the nose and throat in much the same

way as the fumes of burning sulphur. It is heavier than air in the proportion of 1,525 to 1,000, and its diffusive power is very great. A taper will not burn in it even when the gas is diluted with eight times its bulk of air. This, therefore, is generally the test of its presence; but it is not a good test, for a taper will burn in an atmosphere in which an animal cannot exist,—as, for example, in air containing about 10 per cent. of the gas.

"As in the last case, the gas is a powerful narcotic, and will cause immediate asphyxia, if it be breathed in a somewhat pure condition. Even when it is diluted with four times its bulk of air, it destroys life in a few minutes; and with a much larger dilution it produces giddiness and headache, with a sense of weight and throbbing at the temples. This is sometimes followed by slight delirium, and then by an irresistible desire to sleep, the stupor of which passes slowly into coma. According to M. Varin, these effects are produced by the continued inhalation of air charged with about 2 per cent. of the gas; and MM. Peclet and Leblanc assert that animals are affected by an atmosphere containing only 1 per cent. of it. Even so little as 0·5 per cent. is said to be injurious, if it is breathed for a long time.

"If the gas has been produced at the expense of the oxygen of the air, as happens in sewers and crowded rooms, then the effects are more strongly marked; for under these circumstances as little as 3 per cent. will quickly destroy life. Expired air contains from 3 to 5 per cent. of the gas; and the tragedies of the black-hole at Calcutta, and the round-house of St. Martin's, are examples of the terribly fatal power of such an atmosphere: even the proportion of from 1·5 to 2 per cent., will cause almost immediate distress, and a feeling of suffocation. These were the proportions found by Dr. Bence Jones in the dormitories of a metropolitan workhouse, where the effects of the vitiated air were remarkably unwholesome; and, to quote another familiar case, in the atmosphere of the Wellington barracks, where the sickly household troops are lodged, Dr. Roscoe ascertained that the quantity of carbonic acid at night ranged from 0·12 to 0·14 per cent. In a crowded theatre it does not exceed 0·32 per cent.; and yet there are few persons who have not experienced the depressing influence of such an atmosphere. What shall we say, therefore, of the sewer gases, which contain from 0·5 to 2·3 per cent. of it?

"*Ammonia* is another constituent of the sewer air; and is a product of putrefaction. It is known by its peculiar odour, and alkaline reaction. It is lighter than the air in the proportion of 590 to 1,000. The gas irritates the mucous membrane of the nose and eyes; and in some cases it is found in sufficient quantities to produce ophthalmia, and inflammation of the lungs. Parent-Duchâtelet speaks of the first of these as a common effect on the nightmen of Paris, but we do not observe it in this country. When ammonia is inhaled in a concentrated state, it produces immediate asphyxia; when it is somewhat diluted with air, its action is chiefly

on the lungs; and when it is more diluted still, and is breathed for a considerable time, it liquifies the corpuscles of the blood, and produces the symptoms of typhoid fever. Dr. Richardson has lately inquired into this matter, and he finds, from experiment, that the continued action of the gas, even when it is largely diluted with air, is peculiarly injurious to the animal economy, 'the tongue becomes dry and dark; there is an involuntary action of the muscles, varying from a mere twitching to violent convulsions; there are insensibility, extreme sensitiveness to sound, obscurity of sight, and ultimately, if matters are pushed far enough, death by coma. The morbid anatomy is equally demonstrative. The blood is dark and fluid; the serous membranes show petechial spots, and the tissues are softened.'

"Dr. Barker's experiments have confirmed these observations; and they prove that the continued inhalation of atmospheric air, charged with only a small quantity of ammonia, is dangerous to health.

"But there is another property of ammonia which is more dangerous still: it is that of conveying the less volatile products of putrefaction into the air. In all probability, it is the purveyor of the miasms of infected districts, as it is known to be of the fœtid compounds of animal and vegetable decomposition. It was the agent which gave volatility to the putridities of the Thames during the hot weather, and it is the medium by which the more offensive matters of coal gas are held in suspension. Nor is it less powerful in diffusing the sweet odours of plants, and the subtle constituents of many perfumes. It may therefore act for good as well as for evil.

"*The volatile compounds of ammonia, with carbonic acid, and sulphurated hydrogen,* are also injurious. The first act like the alkali itself, and the second like sulphuretted hydrogen. I have found that one part of hydrosulphate of ammonia in 1,000 of air will kill birds almost instantly; and one in 500 will kill rabbits. Dr. Barker has noticed that the symptoms produced by it, even in small quantity, are vomiting, diarrhœa, muscular debility, and quick respiration. The surface of the body becomes hot, and then cold; the tongue protrudes, and looks livid and dry; there is constant twitching of the muscles, and jerking of the limbs; the pulse is quick and feeble; and death follows within a short time, even if the animals are removed from the poisoned atmosphere, and placed in the open air. In an experiment by Dr. Richardson on a dog, the symptoms were those of low fever; and after death, he found the same kind of ulceration in the intestines as is noticed in the typhoid form of the malady.

"*Light carburetted hydrogen, or marsh gas,* is also found in the atmosphere of sewers, but it rarely occurs in such proportion as to be dangerous; now and then, however, it accumulates, as it does in coal mines, and becomes explosive.

"The gas is a product of putrefaction, and it is likewise formed by the action of organic carbon on the elements of water. It

escapes freely from the mud of stagnant ditches, and, as I have already said, from the solid deposit of the sewers. The gas has no odour, and therefore cannot be recognised by its sensible properties. It is about half as heavy as air, the specific gravity of it being 557·6; and it is very combustible, burning with a yellow flame. When it is largely diffused through the atmosphere it forms an explosive mixture, the violence of which is dependant on the proportions of the air and gas. If there is one volume of gas to about 9·5 of air, the explosion is most powerful; but the proportions on either side of this are not so violent; for the shock becomes gradually weaker and weaker until, with one of gas to 14 of air, or 4 of gas to one of air, the mixture does not explode at all. When the combustion is perfect, the products are carbonic acid and aqueous vapour, with the residual nitrogen of the air—the volume of carbonic acid being the same as that of the gas consumed. Such an atmosphere is therefore dangerous to life, not only because of its deficiency of oxygen, but also because of its containing so large a quantity of carbonic acid; and this is the thing to be feared after an explosion in a sewer or coal mine.

"Marsh gas has but little action on the animal body, unless it is breathed in a pure form, and then it causes the general effects of anæsthesia. Miners are often obliged to work in an atmosphere containing from 8 to 10 per cent. of the gas, but they experience no ill effects from it, until the proportion rises to about 20 per cent., and then they feel giddy, with a sense of weight upon the forehead.

"*Coal gas* is likewise present in the sewers: it is not formed there, but escapes from the street mains. The quantity which is let loose in this manner is enormous. Gas engineers say that from 12 to 35 per cent. of all the gas manufactured in London is lost. Now supposing that of this, the leakage amounts to 5 per cent., which my friend Mr. Wright informs me is about the quantity; then as much as 386,400,000 cubic feet of gas escape into the public ways of this metropolis every year, or rather more than a million cubic feet every day; and in the city it amounts to about 25,000,000 cubic feet per annum, or nearly 70,000 cubic feet per day. Most of this must find its way into the sewers, and therefore is a matter of some importance.

"The chief constituents of coal gas are hydrogen and light carburetted hydrogen. The former amounts to about 40 per cent. of the gas, and the latter to 45. The other constituents are about 7 per cent. of carbonic oxide, 2 of nitrogen, 1 of carbonic acid, and 5 of the condensable hydrocarbons. Besides which there are always traces of ammonia, bisulphuret of carbon, and coal tar.

"The principal danger from this gas is, its inflammability, and its property of forming an explosive mixture with atmospheric air.

"The force of the explosion varies with the mixture, and with the volume that is fired. Theoretically, it is known that marsh gas in exploding, exerts a pressure of 38 atmospheres,

hydrogen 26·5, and carbonic oxide 22·6. The force of the other hydro-carbons varies from 44 to 88 atmospheres. My experiments on this point have not been numerous, but they indicate an explosive power of about 30 atmospheres, for ordinary coal gas.

"The physiological properties of coal gas are more marked than those of light carburetted hydrogen; for the condensable hydrocarbons are endowed with great activity as poisons. When, therefore, the gas is inhaled in a concentrated state, it quickly produces insensibility, which is followed by coma and death. An atmosphere containing from 7 to 12 per cent. of gas will kill rabbits and dogs in a very short time; and M. Tourdes found that even a thirtieth or fiftieth part of it in the air, would act injuriously on animals. This proportion causes in the human subject, nausea and headache, with great depression of the vital powers; and if the inhalation is continued for a long time, it produces giddiness and insensibility. Dr. Taylor has collected the records of seven cases of death from the action of coal gas, and it is probable that the air was not charged with more than 8 or 9 per cent. of it in any of them.

"As to the properties and effects of the organic vapour which is contained in sewer gases, I cannot speak with certainty, except that it is matter in a state of active decomposition; and experience has long since decided that matter in this condition has power to disturb the equilibrium of other organic molecules, and to propagate to them its own state of decay. When this occurs in the living animal body, it is productive of the most terrible consequences. Our ignorance of the nature of this organic vapour is not surprising, when we consider that we are equally uninformed of the composition of the subtle miasms and putridities which abound in the air of infected districts, and in the vapours of organic decomposition. Guntz tried to catch the volatile matters of putrid flesh, but he only obtained a stinking liquor that could not be analysed. Moscati condensed the miasm of the pestilential rice fields of Tuscany, but the liquid which he procured defied investigation, notwithstanding that it was so charged with organic matter, that it quickly putrefied. Rigaud did the same with the atmosphere of the marshes of Languedoc, and Boussingault with the air of some of the worst districts of Paris; but their labours were fruitless. Even the wards of a hospital crowded with cholera patients, and the fœtid dormitories of our household troops, and the no less unwholesome dens of the city poor, have been vainly searched for the occult molecules, which are endowed with so much virulence. All that we know of them is that they will reduce the salts of silver and gold, and blacken sulphuric acid; that they contain the elements of organic matter in a state of active change; that they quickly putrefy; and that they form a nidus for the growth of the lowest forms of aimated beings.

"Sometimes these miasms are odourless, but in the case of the sewer gases, it is the organic vapour which gives them their pecu-

liar smell; for when the sulphuretted hydrogen is entirely renewed, there are still the characteristic stinks, which have been so accurately described by Parent-Duchâtelet.

"WHAT ARE THE DANGERS OF THE COMPLEX SEWER GASES THEMSELVES? Experience has shown that they are of two kinds; namely, the dangers which are incidental to the poisonous action of the gases; and those which arise from their explosive property.

"As to the first of these, it must be evident, from what we know of the composition of the gases, and the properties of the individual constituents, that the complex miasms must be exceedingly hurtful to the animal economy. Observation has confirmed this, by proving that they are among the most active poisons. One breath of the undiluted gases will destroy life immediately; and even when they are mixed with a rather large quantity of atmospheric air, they quickly cause asphyxia, or narcotism and death. Those who are exposed to their influence are suddenly deprived of consciousness: they fall powerless, as if they were shot; the lips become livid; the face turgid; bloody froth oozes from the mouth; the surface of the body gets cold; the action of the heart tumultuous and irregular; the breathing difficult and spasmodic; and the sufferer dies in convulsions, or lingers for a short time in deep and irrecoverable coma. In smaller quantity the miasms are less active, but not less certainly injurious; for they produce nausea or actual sickness, vertigo, delirium, and gradual insensibility. The muscles of the face and chest are convulsed; and the action of the heart is feeble and fluttering; the skin acquires a death-like coldness; and the respiration is irregular and catching. In this state the danger is imminent, and if means are not promptly taken for recovery, the patient dies in a state of coma. If the gases are still further diluted with atmospheric air, they produce a general prostration of the vital powers. The appetite fails; the bowels become disturbed; diarrhœa of a chronic character sets in; and the sufferer is either worn out by exhaustion, or he falls into a state of low fever, from which it is difficult to raise him.

"I need not weary you with examples of the acute forms of poisoning by these gases, for they are but too well known. It is, however, necessary for my purpose that I should mention a few cases of chronic poisoning, in which the effects were produced by the inhalation of very small quantities of sewer miasms. One of the most remarkable instances of this is recorded by M. D'Arcet. He states that there was a small lodging in Paris, consisting of a bed-room and ante-room, which had been successively tenanted by three vigorous young men, each of whom died within a few months of his occupying the place. D'Arcet was requested to examine the rooms, and ascertain the cause of the evil, He found that a pipe from a privy in the upper floor ran down by the side of the wall near to the head of the bed where the inmates slept. The pipe was unsound, and the wall was damp from leakage of the soil into it; but there was no perceptible smell in the room when

D'Arcet examined it: nevertheless he had no doubt that the deaths of the former occupants were referable to the emanations from the wall. The pipe was, therefore, repaired, and from that time the unwholesomeness of the place was cured.

"In August 1831, twenty-two boys living at a boarding school at Clapham, were suddenly seized with alarming symptoms of irritation in the stomach and bowels, with twitchings of the muscles of the arms, and excessive prostration of strength. Another boy had been similarly attacked three days before, and he died in twenty-five hours: one of the others died in twenty-three hours. A suspicion of accidental poisoning naturally arose, and the various utensils, and articles of food used by the family were examined, but nothing of a deleterious nature was found. The only circumstance which appeared to explain the accident was, that two days before the first child was taken ill, a foul cesspool had been opened, and the matter of it diffused over a garden adjoining to the children's play-ground. This was considered to be the cause of the disease; and the opinion was formed not only by the medical attendants, but also by Drs. Latham, Chambers, and Pearson, who personally examined the whole of the particulars.

"The third instance to which I shall refer is of more recent date, and has been a subject of considerable discussion. In the month of August 1852, an attempt was made to drain the town of Croydon by means of small stoneware pipes, which were not only of insufficient size but were imperfectly cemented together. The consequence was that a large quantity of the sewage escaped into the earth, and drained away to the neighbouring ditches. This became a subject of great annoyance; and in a short time it produced an alarming outbreak of fever, diarrhœa, and dysentery.

"In the report from the Poor Law Commissioners on the sanitary condition of the labouring population of Great Britain there are many examples of the morbific action of sewer and cesspool gases. There is one case which is remarkable for its significance. On the north side of a street in Derby there are fifty-four houses, all of the same description, and inhabited by the same class of persons. Six of these houses, in the very centre of the row, became the abodes of fever; and of sixteen persons attacked with the disease, five died. The fever was nowhere else in the row; and on inquiry it was found that these, and these only, were exposed to the action of sewer gases, and to the miasms from cesspool matter which had soaked into the soil.

"The Remedy for the Sewer Miasms. This is the great question which you have submitted to me for consideration, and the preceding facts show clearly enough that it is an important question. I am far from thinking with your engineer that the mischief occasioned by sewer gases is not of such magnitude as to be worth a remedy that may cost sixpence a head to the population; nor do I believe that if you had temporised with the matter, and had yielded to the demand on the part of the public, to close

up the ventilating gratings, which are now so offensive, and had thus turned the foul gases into the house drains, the nuisance would have been regarded simply as a domestic evil, for which the cure was to be sought privately and individually by those who felt the annoyance: in fact, such a proceeding would have been unworthy of the trust which is reposed in you as the custodians of the public health, for it would have been a matter of life or death to the great bulk of the community.

"At all times attempts have been made to destroy or neutralise the offensive products of decomposition; and the simplest way of doing it has been by the use of another scent—a perfume or volatile oil, which would cover or mask the offensive body. These were the correctives employed in religious worship. They entered into the composition of the ointments of the high-priest, and the incense of the altar; and to this day they have enjoyed a reputation and general popularity which they have not deserved; for their action is not on the putrid product, but merely on the sense of smell, which they blunt to the action of the offensive vapour. In the middle ages, when the plague, the black-death, and sweating sickness, and pestilential fever, desolated the cities of Europe, immense importance was attached to the use of perfumes: fumigations with costly spice and rich smelling oriental drugs were largely used in the houses of the rich, but with no good effect. The ancients also knew the value of fire as a disinfectant; and they also made use of the fumes of burning sulphur.

"But the right knowledge of the action of disinfectants and deodorisers dates from a very recent period; for so late as the year 1773, Guyton Morveau, one of the best chemists of France, thought that the vapours of muriatic acid were the most powerful of disinfectants; and later still, in the year 1803, Dr. Carmichael Smith obtained a grant of £5,000 from parliament for a suggestion which is nearly valueless, namely, the employment of the fumes of nitrous acid. Chlorine gas was discovered by Scheele in 1774, and soon afterwards its disinfecting properties were noticed by Berthollet; but its use cannot be dated farther back than the beginning of the present century, when Guyton Morveau and Dupuytren first pointed out the great value of it as a disinfectant; and even then it was not generally employed: in fact, its present popularity dates only from the time that chloride of lime has been largely manufactured for bleaching purposes. Within the last twenty years, almost all the refuse products of the arts, and a great number of special compounds, have been recommended for the deodorisation of sewage, etc. They all act in one of two ways: they either give stability to the organic matter, and so check its tendency to decay, or they operate on the putrid vapours, and destroy their offensive properties. This they do either by fixing the effluvium, and forming compounds which are inert, or by breaking up the putrid molecule, and changing its nature, or by expediting the process of decay, and hurrying it on to the last stage of oxydation.

"Those substances which give stability to organic matter are properly called *anti-septics* or *anti-putrescents*. They have always been more popular than any of the second class of deodorisers, because of their importance in the arts. Salt, sugar, vinegar, creasote, and the empyreumatic oils of wood, peat, coal, etc., are examples of this class; so also are chloride of zinc, sulphate of copper, and corrosive sublimate—substances which have been respectively patented by Sir William Burnett, Mr. Margary, and Mr. Kyan. Alum, and the astringent matter of many vegetables, have likewise been used for ages as the means of preserving gelatinous tissues, in the form of leather. None of these, however, except the chloride of zinc, is applicable to the case before us; and that operates more as a deodoriser than an anti-putrescent. In fact, as I have already stated, the matters of sewage are always in a high state of decomposition, and cannot therefore be treated with much advantage, unless the antiseptics are applied to them, before they enter the sewers: and this, I need not say, is altogether impracticable. Even in Paris, where there are special contrivances for such a purpose, it fails because of its utter impracticability.

"Of the second class of substances, namely, the *deodorisers* and *disinfectants*, there are many which deserve notice.

"Those which combine with the putrid gases, and fix them in an involatile form, are the metallic oxides, and their salts, as chloride and sulphate of zinc; acetate and nitrate of lead; sulphate, muriate and pyrolignate of iron; impure muriate of manganese—the refuse of bleaching works; common alum; the fixed alkalies; and the salts of lime and magnesia. Most of these compounds unite with the sulphuretted hydrogen and ammonia of sewage; and so far, therefore, they remove the unpleasant smell of if, but they do not touch the organic vapours. Besides which, they are difficult to apply, and are very costly. In fact, putting aside all the working expenses that would attend their use, the mere cost of the deodorizers alone would range from about £20,000 to upwards of £1,000,000 per annum for the city sewage; and from £1,000,000 sterling to £48,000,000 for the sewage of the whole of London. This, together with the insufficiency of their power, as deodorisers, and the difficulty of applying them while the sewage is within the sewers, deprives them of all practical utility. That power which they do possess, namely, the power of coagulating a great part of the soluble matter of sewage, and favouring the precipitation of the insoluble, can only be applied, with any chance of success, after the sewage has left the sewers; and even then there are but two of them, namely, lime and the superphosphate of lime with magnesia, that can be used with advantage.

"Of the second class of disinfectants, those which act chemically on the volatile matters and break them up, so as to form new compounds, which are inert, the most important are, chlorine, chloride of lime, hypochlorous acid, sulphurous acid, and nitrous acid. The first three of these, namely, chlorine and its oxy-com-

pounds, operate by abstracting hydrogen from the putrid vapours, and perhaps also by decomposing water, and setting the oxygen free to destroy the miasms. Their power is remarkably great, as may be seen by the action of chlorine or chloride of lime on ordinary sewage; eight grains of chloride of lime, or less than an ounce of a solution of chlorine will completely deodorise a gallon of sewage, and the diffusion of a little chlorine through the worst kind of sewer gases is sufficient instantly to deprive them of their offensive odour. Nevertheless, chloride of lime is a costly agent; for, if it be used in the proportion of only eight grains to the gallon, it will cost nearly £57,000 a year, for the deodorisation of the city sewage, and nearly £237,000 for the sewage of all London. As for the gas itself it is almost impossible so to apportion and manage the diffusion of it in the sewers as not to have either the chlorine or the sewer gases in excess.

"Sulphurous acid and nitrous acid are still less manageable. Besides which they are exceedingly costly, and are not nearly as powerful in their action as chlorine. Like chlorine, however, they disorganise the putrid molecules, and decompose the hydro-sulphur compounds, and fix ammonia; but, like it also, they are powerful irritants, and could scarcely be let loose into the sewers without danger to the workmen.

"The last of the disinfectants are those which expedite the process of decay, and cause the putrid matters to combine with oxygen, and to become inert. Of this class there are two members, namely, those which act chemically and supply oxygen of themselves to the offensive compounds; and those which merely facilitate oxydation by their physical properties. The manganates and per-manganates of potash are the best examples of the first class. They contain a large proportion of oxygen, which they freely give up to putrid organic matter, and so destroy it. These compounds have been patented by Mr. Condy, of Battersea, and he supplies them in a state of solution of various strengths. That which I have used in my experiments contained nearly 6 per cent. of the per-manganate, and could be supplied at a shilling a gallon. One hundred and fifty drops of it were sufficient to deodorize a gallon of ordinary sewage; but the disadvantage of it is, that it has no power to destroy the foul gases which have already escaped into the sewer air. Besides this, the cost of the material, even if it were used in the proportion of 150 grains to the gallon, would be about £753,000 a year for the city sewage, or more than three millions per annum for that of the whole metropolis. Looking, however, merely at the chemistry of the subject, it must be admitted that Mr. Condy's solution is a powerful and valuable disinfectant.

"The second of this class of disinfectants are the agents which promote oxydation by a physical property, that is by bringing the putrid matters into contact with atmospheric oxygen. There are three of them, namely, fire, water, and porous solids. The first

effects the change by active combustion, and the others by a slower process of oxydation, which is called *eremacausis*, or slow burning. All of them, however, are complete in their action, and are, under different circumstances, more or less manageable and useful.

"The value of fire as a disinfectant is well known, and has been recognised from the remotest time. The sacrificial altars of early nations were the rude methods by which the agent was employed; and so fully did the ancients believe in its salutary action, that in times of pestilence it was often resorted to as the only effective means of purifying the atmosphere. In the popular mind there has always been a notion, that the Plague of London was exterminated by the great fire. Powerful, however, as the agent is, it does not appear to be applicable to the destruction of the sewer gases, notwithstanding that the use of it for such a purpose has always been a favourite idea with every new commission of sewers, and is the basis of most of the amateur schemes of the present day. Mr. Bazalgette has stated, in his evidence before the House of Commons, that putting aside all the difficulties of controlling the course of the air in the main channels of the sewers, and of stopping the leakage from the thousands of openings in the streets, closets, and drains, the mere cost of the fuel for the furnaces would not be less than £80,000 a year, and perhaps it might reach to upwards of £200,000.

"The destruction of the sewer miasms by the agency of water is not quite so unmanageable, and has therefore received attention from many of the leading engineers of the present day. Mr. Bazalgette says of it, that it is the best and only available means of purifying the sewers. As to its salutary action there can be no doubt, for its power as a disinfectant, in the presence of atmospheric air, is manifested in every river in the kingdom. Wheresoever the putrid refuse of a town mixes with a large volume of fresh water, there the process of oxydation is quickly carried out, and the offensive matters are rendered innocuous. Even the river Thames, except at a peculiarly dry and hot season, finds within itself a means of purification which is quite equal to the contaminating influence of the soluble organic matter that flows into it. This is effected by the physical power which water possesses of transferring oxygen from the atmosphere to the putrid products; and this power is so great that it will even destroy the soluble organic constituents of ordinary sewage without further dilution with water.

"I cannot inform you very accurately what quantity of water is necessary for the purpose of disinfection. Already there is a daily supply of about thirty-one gallons to each of the inhabitants of this metropolis; but this is evidently not sufficient to cleanse the sewers; for independently of the existence of a putrid atmosphere within them, there is the stronger evidence of their foulness in the condition of the sewage which is discharged immediately after a heavy fall of rain. And even if it could be determined precisely what amount of water would effect the purpose, there is still the

difficulty of distributing it so as to scour out all the channels, to the very smallest; for this could not be accomplished without special contrivances for delivering the water at the head of every drain. I do not, therefore, see much prospect of success in this mode of dealing with the subject.

"The last means of destroying the offensive matters of sewage is by the agency of a porous solid; and this may be applied either to the sewage itself, or to the gases which are evolved from it. The best examples of such an agent are common clay and charcoal. Both of them operate in the same way,—namely, by condensing the putrid vapours within their pores and upon their surface, so as to cause them to unite with atmospheric oxygen: they produce, in fact, a species of slow combustion, by which the miasms are gradually consumed. To effect this, however, there must be free access of atmospheric air: hence it is these substances have but a limited power of deodorization when they are mixed with the liquid sewage, or are so overcharged with water as to be incapable of absorbing oxygen.

"Every one is familiar with the deodorizing power of common earth: in fact, the graveyards of every city testify of the enormous quantities of organic matter that can be disposed of through its agency; and no one who has witnessed the rapidly deodorizing power of clay, when sewage or night-soil is distributed upon the land, can doubt its efficacy. The Chinese have long taken advantage of this power; for they mix night-soil with about one-third of its weight of fat marl, and knead it into cakes, which are common articles of commerce. In practice, here also it is found that a ton of clay will deodorize about three tons of the solid matter of sewage. But powerful as this action is, it is not applicable to liquid sewage. Even in the case of charcoal, which is a much more energetic deodorizer than common clay, the power is speedily lost when it is mixed with fluid refuse. Dr. Hofman found that four cubic feet of charcoal began to lose their power of deodorization when about seventy-eight gallons, or rather more than three times their bulk, of sewage had passed through them: and Mr. Blyth's experiments are to the same effect. To this I may add that the cost of this mode of deodorization would be upwards of £230,000 a year for the City sewage, or nearly a million for the sewage of all London; and even then the remedy would be but imperfect, to say nothing of the fact that it would contribute largely to the solid matters already in the sewers.

"The most effective way of using charcoal as a deodoriser, is to take advantage of its power of absorbing the putrid miasms when they are in a vaporous condition. This power is remarkably great. It was noticed by Saussure, as far back as 1814, that charcoal took up from 1·75 to 90 times its bulk of various gases. Count Morozzo had also observed the same fact, and had directed attention to it; and later still, Messrs. Allen and Pepys found that different kinds of charcoal had different powers of absorption. But

it is only very recently that we have been well informed of this matter; and we owe our knowledge of it to the researches of Dr. Stenhouse, who, in 1853, had his attention directed to the fact that when the dead bodies of large animals are covered with a layer of charcoal, they putrefy without evolving any unpleasant odour, notwithstanding that they are kept for many months.

"These results suggested the use of charcoal as a respirator and an air filter; and soon after Dr. Stenhouse proposed it as a purifier of the foul gases which escape from the street gullies, the sewer ventilators, and the drains of private houses. One of his air filters is, I believe, in action in the justice-room of the Mansion House, and another in the justice-room of Guildhall; and Dr. Stenhouse reports that their operations have been successful and continuous for a long time.

"I have myself repeated some of Dr. Stenhouse's experiments during the last twelve months; and have ascertained that the offensive gases from a close cesspool are completely deodorized by passing them through a small box containing about 36 cubic inches of coarsely powdered peat charcoal. I have had this in continual action for about three months; and although the charcoal has not been renewed, yet it does not show any sign of derangement or loss of power.

"All kinds of charcoal, however, are not equally valuable for this purpose. Dr. Stenhouse found that wood charcoal and peat charcoal are the most effective. Mr. Blyth's experiments at the Board of Health, and the inquiries made in my own laboratory by Mr. Fewtrell, are to the same effect. The cause of this superiority is doubtless due to the great porosity of vegetable charcoal. Liebig states that the pores in a cubic inch of beech-wood charcoal must at the lowest computation be equal to the surface of 100 square feet; and several other chemists have estimated it at more than double this amount. Hence the extraordinary physical power of wood charcoal in absorbing and condensing gases and vapours within its pores; so that when it is exposed to an atmosphere containing the putrid products of decomposition, it absorbs and oxydises them by a species of combustion that is as effectual as if they were passed through the ignited coals of a furnace.

"Now in making a practical application of these facts it is manifest that we have in common wood charcoal a powerful means of destroying the foul gases of sewers. How it is to be applied is fortunately a question of but little embarrassment; for let the sewers be ventilated as they may, either by open gratings in the street, or by the rain-water pipes of the houses, or by the pillars of the gas lamps, or by tubes carried up at the landlord's expense from the drains of every house, or by especial shafts in the public streets; in fact, let the gases go out of the sewers how they will and where they will, you have but to place a small box containing a few pennyworths of charcoal, in the course of the draft, and the purification of the air will be complete."

# PROGRESS OF EPIDEMICS.

## LOCAL REPORTS OF EPIDEMIC AND ENDEMIC DISEASES

*During the Months of June, July, and August*, 1858.

| Place. | County. | Lat. | Long. | Observer. |
|---|---|---|---|---|
| St.Mary, Scilly | Cornwall - | 49.50 N. | 6.24 W. | J. G. Moyle, Esq. |
| Teignmouth - | Devonshire - | 50.32 N. | 3.29 W. | W. C. Lake, Esq. |
| Portsmouth - | Hampshire - | 40.58 N. | 6. 6 W. | Alfred Jackson, M.D. |
| Odiham - - | Hampshire - | 51. 8 N. | 1. 3 W. | J. McIntyre, M.D. |
| Canterbury - | Kent - - | 51.17 N. | 1. 4 E. | G. Rigden, Esq. |
| Chatham - | Kent - - | 51.21 N. | 0.14 E. | F. J. Brown, M.D. |
| Wandsworth - | Surrey - - | 51.28 N. | 0. 7 W. | G. E. Nicholas, Esq. |
| Putney - - | Surrey - - | 51.28 N. | 0. 8 W. | R. H. Whiteman, Esq. |
| Up. Holloway | Middlesex - | 51.32 N. | 0.03 E. | W. B. Kesteven, Esq. |
| Hawkesbury - | Gloucestersh. | 51.34 N. | 3.20 W. | W. I. Cox, Esq. |
| Swansea - | Glamorgansh. | 51.38 N. | 2.50 W. | W. H. Michael, Esq. |
| Colchester - | Essex - - | 51.54 N. | 0.52 E. | Henry Laver, Esq. |
| Aspley Guise - | Bedfordshire - | 52. 1 N. | 0.37 W. | J. Williams, M.D. |
| Saffron Walden | Essex - - | 52. 3 N. | 0.12 E. | T. Spurgin, Esq.<br>H. Stear, Esq. |
| Bedford - - | Bedfordshire - | 52. 8 N. | 0.51 W. | T. H. Barker, M.D. |
| Newpt.Pagnell | Buckinghams. | 52.10 N. | 0.42 W. | G. O. Rogers, Esq. |
| Sharnbrook - | Bedfordshire - | 52.12 N. | 0.40 W. | R. S. Stedman, Esq. |
| Wellingbro' - | Northamptons. | 52.20 N. | 0.40 W. | B. Dulley, Esq. |
| Beccles - - | Suffolk - - | 52.25 N. | 1.48 E. | W. E. Crowfoot, Esq. |
| Thetford - | Norfolk - - | 52.26 N. | 0.45 E. | H. W. Bailey, Esq. |
| Stourbridge - | Worcestersh. - | 52.28 N. | 2.32 W. | A. Freer, Esq. |
| Dudley - - | Staffordshire - | 52.30 N. | 2.10 W. | J. H. Houghton, Esq. |
| Barrowden - | Rutland - | 52.34 N. | 0.38 W. | H. J. Swann, Esq. |
| Wisbeach - | Cambridgesh. | 52.39 N. | 0. 5 E. | W. H. Hole, Esq. |
| East Dereham | Norfolk - - | 52.40 N. | 0.57 E. | J. Vincent, M.D. |
| Pontesbury - | Shropshire - | 52.43 N. | 2.50 W. | Wm. Eddowes, Esq. |
| Nottingham - | Nottinghamsh. | 52.50 N. | 1.10 W. | T. Robertson, M.D. |
| Burton-on-Trt. | Staffordshire - | 52.53 N. | 1.53 W. | S. Thomson, M.D. |
| Oswestry - | Shropshire - | 52.53 N. | 2.59 W. | P. Cartwright, Esq. |
| Wrexham - | Denbighshire - | 53. 2 N. | 3. 1 W. | E. Williams, M.D. |
| Hawarden - | Flintshire - | 53.11 N. | 3. 2 W. | T. Moffat, M.D. |
| Lincoln - - | Lincolnshire - | 53.12 N. | 0. 5 W. | S. Lowe, Esq. |
| Alford - - | Lincolnshire - | 53.15 N. | 0. 6 E. | R. U. West, M.D. |
| Gainsborough | Lincolnshire - | 53.23 N. | 0.47 W. | D. Mackinder, M.D. |
| Liverpool - | Lancashire - | 53.24 N. | 2.59 W. | Thos. Bickerton, Esq. |
| Warrington - | Lancashire - | 53.25 N. | 2.32 W. | C. N. Spinks, Esq. |
| Wigan - - | Lancashire - | 53.32 N. | 2.33 W. | Jephtha Hussey, Esq. |
| Bolton - - | Lancashire - | 53.35 N. | 2.19 W. | W. H. Pendlebury, Esq. |
| York - - | Yorkshire - | 53.58 N. | 1. 3 W. | W. Procter, Esq. |
| Wst. Auckland | Durham - | 54.45 N. | 1.40 W. | G. Todd, Esq. |
| Rothbury - | Northumberld. | 55.25 N. | 1.50 W. | E. C. Summers, Esq. |
| Lerwick - | Shetland Isles | 60. 9 N. | 1. 8 W. | G. W. Spence, M.D. |

## QUARTERLY STATEMENT—No. XV.

[*The dates denote that the disease appeared in the weeks then ending.*]

SCARLET FEVER.

Portsmouth—June 11
Odiham—June 11-25, July 30, all Aug.
Canterbury—All August
Chatham—All June, July 2, 16, 30
Putney—June 4, August 20
Up. Holloway—August 13-27
Swansea—June 4, 18, July 2
Colchester—Every week
Aspley Guise—June 18-25, July 2*

* One case only, imported from a neighbouring village.

Beccles—June 4-11, July 23-30, all Aug.
Thetford—All August
Dudley—June 18-25, July 2, Aug. 6-13
Barrowden—All August
Wisbeach—August 13-27
East Dereham—August 13-27
Pontesbury—June 18-25, all July & Aug.
Nottingham—July 23-30
Burton-on-Trent—June 4-11, July 23
Lincoln—All July
Alford—August 20
Gainsborough—June 25, July 2-16, Aug.
Liverpool—Every week [13
Warrington—August 13, 27
Wigan—July 2, 23, August 27
Bolton-le-Moors—All June, July 2-9, 30, all August
York—June 18-25, July 9-30, all Aug.

MEASLES.

Portsmouth—June 4
Odiham—July 23, August 20-27
Canterbury—Every week
Chatham—All June, July 2, 23, Aug. 6
Wandsworth—July 30, Aug. 6-20
Swansea—Every week
Colchester—June 11-25, July 16-30,
Bedford—All August [Aug. 6
Beccles—All June, July 2
Stourbridge—July 16-30, Aug. 27
Dudley—June 11-25, July 9-23, Aug. 13-
Alford—June 11, 25, all July & Aug. [27
Gainsborough—June 25
Liverpool—Every week
Warrington—July 2-16
Wigan—June 11-18, July 9, 23, Aug. 6, 27
Bolton-le-Moors—June 11-25, July 2, 23-30, all August
York—June 18, July 2, 23, Aug. 6-20
Lerwick—August 6, 20

SMALL-POX.

Portsmouth—June 11-18, July 30
Canterbury—July 23-30, Aug. 6-13
Chatham—All June and July, Aug. 6
Up. Holloway—July 9
Hawkesbury Upton—June 4-18
Swansea—June 4-18
Colchester—June 25, July 2-9, 30, Aug. 6
Bedford—August 27
Stourbridge—June 4, 18-25, July 9
Dudley—June 25, July 16-30, Aug. 13, 27
Barrowden—June 4, 18
Wisbeach—June 4-11
Pontesbury—July 9-30
Nottingham—June 4
Burton-on-Trent—June 4, 25
Oswestry—All June, July 2-16
Wrexham—Every week
Gainsborough—July 30, all August
Liverpool—Every week
Wigan—June 11, July 16
Bolton-le-Moors—Every week
Lerwick—June 4, 18

HOOPING COUGH.

St. Mary's, Scilly—All June, July 2-16
Portsmouth—July 9
Canterbury—June 4-18, July 9, 23
Chatham—July 9
Wandsworth—All June, July 9, 23-30,
Up. Holloway—All June [Aug. 13
Hawkesbury Upton—All June & July,
Swansea—Every week [Aug. 6-13
Colchester—Every week
Bedford—July 16-30, all August
Newport Pagnell—July 2, Aug. 27
Beccles—June 4-18
Thetford—August 20
Dudley—June 11, July 9
Wisbeach—June 4-18
Pontesbury—Every week
Nottingham—June 4-18
Burton-on-Trent—July 2, 30, Aug. 6-13
Hawarden—June 18
Alford—Every week
Gainsborough—Every week
Liverpool—Every week
Warrington—June 11-18, July 16-23
Wigan—June 11-18, July 9, 23, Aug. 6, 27
Bolton-le-Moors—June 11-25, July 23-30, August 6, 20-27
York—June 4, 18, July 2, 16
Rothbury—July 16

CROUP.

St. Mary's, Scilly—August 20
Portsmouth—August 27
Chatham—July 16
Hawkesbury Upton—June 4
Swansea—June 11-25, July 9, 23
Newport Pagnell—August 20
Beccles—August 20-27
Thetford—June 4
Stourbridge—August 6-13
Dudley—July 23
Liverpool—June 11, 25, July 2, 16, Aug.
Wigan—August 6 [6, 27
Bolton-le-Moors—June 18-25, July 16-
York—July 9, Aug. 6 [23, Aug. 6

CATARRH.

Teignmouth—July 16 [27
Odiham—June 4-18, July 9-23, Aug. 13-
Chatham—June 11-18, July 2, 30, Aug. 20-27
Wandsworth—June 4, 18, July 2, 23-30, August 13-27 [Aug. 6-20
Putney—June 4-11, 25, July 2-9, 23-30,
Up. Holloway—June 18-25, July 2
Hawkesbury Upton—August 20-27
Swansea—June 4-18
Saffron Walden—June 25
Newport Pagnell—June 4-11, Aug. 20
Beccles—June 11-18, July 2 23

Thetford—June 4, 18-25, July 9-16, August 6-13, 27
Dudley—June 18, July 16, Aug. 13
Wisbeach—August 13-27
Nottingham—June 4
Oswestry—Every week
Gainsborough—All June, July 2-30,
Liverpool—Every week [Aug. 6-20
Bolton-le-Moors—June 4-18, July 16-30, August 13-20
Lerwick—June 4, 25, July 2-9, Aug. 6

INFLUENZA.

Chatham—June 4, July 2, Aug. 13 27
Aspley Guise—July 9-30
Newport Pagnell—All June & July, Aug.
Sharnbrook—June 11-18 [20
Beccles—June 4-11
Thetford—June 4-11, 25, July 9, 30,
Oswestry—July 9-23 [Aug 6, 20-27
Liverpool—All June, July 2-23
Bolton-le-Moors—June 18-25, July 2, 30, August 6-13
York—June 4, 18-25, July 9, 23
Lerwick—June 4

ERYSIPELAS.

Portsmouth—June 11
Odiham—August 6, 20-27
Canterbury—July 9
Chatham—June 4, July 2, all Aug.
Wandsworth—June 11, July 30, Aug. 13,
Putney—June 11-18 [27
Saffron Walden—August 13, 27
Bedford—June 25, July 2
Newport Pagnell—July 30, Aug. 6, 27
Sharnbrook—July 9, 23
Thetford—June 4, 18-25, July 16, Aug. 27
Stourbridge—July 30, August 6
Dudley—June 18, July 2-9, Aug. 20
Wisbeach—All August
East Dereham—August 13-27
Pontesbury—July 23-30, Aug. 6-20
Nottingham—July 2, August 13
Burton-on-Trent—June 4, July 23
Oswestry—July 23-30, Aug. 6-13
Wrexham—August 6-13
Alford—July 9, August 6
Gainsborough—July 23, Aug. 27
Liverpool—Every week
Bolton-le-Moors—June 11-25, July 2, 23-30, August 6, 27
Lerwick—June 11

CHOLERA.

Chatham—July 2, 16, 30, Aug. 6
Alford—August 20-27
Bolton-le-Moors—June 4-18, July 9-30

AGUE.

Southsea—June 11
Odiham—July 23
Canterbury—June 18-25, Aug. 13
Chatham—All June and July, Aug. 27
Colchester—Every week
Bedford—All June
Beccles—August 13-27
Thetford—June 4-11, 25, July 16-23, August 6, 20-27
Barrowden—June 4-18, July 2-9, 23-30
Wisbeach—All June, July 2-16
East Dereham—Every week
Nottingham—June 4, 18, July 9
Burton-on-Trent—July 23
Lincoln—All June
Alford—All June

REMITTENT FEVER.

Teignmouth—June 11-18, July 9, 30, August 6-13, 27
Canterbury—June 11-18, July 2
Putney—June 4, July 30
Saffron Walden—June 4
Newport Pagnell—June 4-11, July 30, August 13, 27
Sharnbrook—July 23-30, all Aug.
Beccles—June 25, July 2-9
Thetford—June 25. July 16-23
Dudley—June 11
Nottingham—July 2, 23-30, Aug. 6
Oswestry—June 25, July 2-9, Aug. 13-27
Alford—June 11-25, all July and Aug.
Warrington—July 16
Bolton-le Moors—Every week
York—June 11, July 2, 23, Aug. 20
Rothbury—June 11-18, August 6

DIARRHŒA.

St. Mary's, Scilly—August 13, 20
Teignmouth—June 11, 25, July 9, 30, August 6-13, 27
Southsea—July 16, 30, Aug. 6-20
Odiham—All August
Canterbury—June 25, all July & Aug.
Chatham—All June, July 2-9, 23-30, all August [Aug.
Wandsworth—June 4, 18-35, all July &
Putney—June 25, July 2 23, Aug. 6
Up. Holloway—June 18-25, July 2, 23, August 27
Hawkesbury Upton—Aug. 13-27
Swansea—Every week
Colchester—July 30, all August
Aspley Guise—July 23-30, Aug. 6
Saffron Walden—June 11, 25, July 23-30, August 6, 20
Bedford—June 18, July 2, 16, 23, all Aug.
Newport Pagnell—Every week
Sharnbrook—June 11, July 2-23, Aug. 13-27
Wellingborough—All June, July 2, Aug.
Beccles—June 18, Aug. 13-27 [13-27
Thetford—Every week
Stourbridge—July 23-30, all Aug.
Dudley—June 11-25, all July & Aug.
Barrowden—June 11, July 2, 30, Aug. 20

Wisbeach—All June, July 2-16, Aug. 20-27
East Dereham—July 16-30, all Aug.
Pontesbury—All July and August
Nottingham—June 4, July 2
Burton-on-Trent—July 16, Aug. 20-27
Oswestry—Every week
Wrexham—August 13-27 [6,20
Hawarden—June 4,25,July16,30, Aug.
Lincoln—July 9-30, August 6-20
Alford—June 25, July 2, 23-30, all Aug.
Gainsborough—Every week
Liverpool—Every week
Warrington—August 13-27
Wigan—June 11-25, July 9, Aug. 6, 20, 27
Bolton-le-Moors—June 11-25, July 9-30, all August
York—June 18, July 9-30, all Aug.
Rothbury—June 4, 25, July 2-9
Lerwick—June 4, July 2-9, Aug. 6

DYSENTERY.

Teignmouth—July 2-9
Odiham—August 20-27
Chatham—June 4, 25, July 9-16
Wandsworth—June 11, July 2-9
Up. Holloway—July 16
Newport Pagnell—All July, Aug. 20
Stourbridge—July 30, Aug. 6, 27
East Dereham—July 16-30
Nottingham—June 11, July 9-16, Aug. 6
Hawarden—August 6
Alford—June 25, July 2
Gainsborough—June 18-25, July 2, 23-
Liverpool—Every week [30
Wigan—August 27 [Aug. 6-13
Bolton-le-Moors—All June, July 16-30,
York—July 9, 23, August 6-20

TYPHUS.

Teignmouth—June 11, July 2, 16-30, August 6-13
Portsmouth—June 25, July 9-30, Aug.
Odiham—All August [20
Canterbury—Every week [27
Chatham—June 11-18, July 30, Aug. 20-
Wandsworth—All June, July 2 9, 23-30, August 6-13, 27
Putney—June 4, August 27
Bedford—June 11, 25, July 2-16, 30
Thetford—June 4, all August
Dudley—June 11-25, all July & Aug.
Wisbeach—August 13-27
Nottingham June 25, August 13
Wrexham—All August
Lincoln—August 6 20
Alford—June 25, all July and Aug.
Gainsborough—August 13
Liverpool—Every week
Bolton-le-Moors—June 11-25, July 23-30, August 13-27

PUERPERAL FEVER.

Alford—June 4 [6
Bolton-le-Moors—June 25, July 2, Aug.

DIPHTHERITE.

Portsmouth—June 25, July 2-9, Aug. 27
Canterbury—June 25, July 2-30
Thetford—July 9, 30, Aug. 6-13, 27
Lincoln—July 16-30, August 6-20
Alford—July 30, all August

TYPHOID FEVER.

Colchester—Every week
Stourbridge—August 20-27
Burton on-Trent—August 20-27

RHEUMATISM.

Thetford—June 4-11, 25, July 9-23, August 6-20

CARBUNCLE.

Portsmouth—June 25, Aug. 13
Chatham—July 16-30
Swansea—July 23-30, all August
Saffron Walden—August 6, 20
Newport Pagnell—July 30, Aug. 6
Sharnbrook—August 13-27
Beccles—July 16-23, Aug. 20-27
Stourbridge—August 6
East Dereham—August 20-27
Pontesbury—June 25
Nottingham—June 18
Oswestry—July 2-16
Wrexham—August 13-20
Gainsborough—August 20-27
Bolton-le-Moors—June 18-25, July 30

## ADDITIONAL OBSERVATIONS.

*St. Mary's, Scilly.*—Mr. Moyle says: "This quarter, ending August 27th, has been, on the whole, remarkably healthy. Hooping-cough continued on the Islands until the third week in July. There was one death from hooping-cough, complicated with dentition and epilepsy, in a child of eight months. On August 9th, there was one death from croup; the first case I had witnessed during my residence at Scilly (nine years). I was called late to the case, and could not induce the parents

to consent to tracheotomy. I do not know to what to attribute this freedom from croup in these Isles of the Atlantic, unless it be our equable temperature. The average ozone for the quarter has been 3.1 per week. The weather has been very fine on the whole; the depth of rain for the quarter being 6.8 inches. The highest day temperature was 79°, the lowest night temperature 54° Fahr. The harvest has been an average one; and there has been no disease among the cattle."

*Teignmouth.*—Mr. Lake writes: "The temperature of the air, which had risen rather suddenly at the end of May, continued remarkably high through June. It fell a good deal during the first ten days of July, rose during the middle of the month, fell somewhat at its close, again rose, and then declined during the latter half of August. The highest points reached during these periods were, 78.0° on June 23rd; 78.6° on July 12th; and 78.7° on August 10th. The mean temperature of July (60.1°) and of August (61.1°) was about the average; but June was almost uninterruptedly a period of elevated temperature. Its mean temperature (61.4) was 3.6° above its average for the last five years, while its mean maximum temperature (72.0°) was above that of any month of the last five years, with the exception of August 1857. The mean barometric pressure of June was 30.035; that of July, 29.919; of August, 29.955. The air during the quarter was on the whole dry. The rain fall, with the exception of that on one day, not very great. Of the 4.897 inches that fell during the three months, 2.087 fell on July 27th. The wind during each month blew most frequently from the north. The amount of ozone for June was 5.9; for July, 6.4; for August, 6.0. A good deal of thunder and lightning occurred between the 7th and 10th of June. The town, during the quarter, has been very healthy. Disorders affecting the respiratory organs have been very much in abeyance; whilst those affecting the digestive system have not been numerous. Thirteen cases of diarrhœa only have come under my notice in the three months, five of which occurred in infants; and only two of dysentery. Nine cases of fever in adults have come before me in the same time; and although, in the list placed under the head of typhus, they have no more resemblance to the typhus of Jenner, or the old-fashioned low typhus fever of books, than they have to scarlatina, their type being the bilious or gastric, with a tendency to remission; the usual type, indeed, of fever here."

*Southsea.*—Dr. Jackson writes: "Two children were attacked with diphtheria in one house—a boy, aged 6, and a girl, aged 3 years. There was more local mischief in the boy's case; and

a large leather-like mass was discharged from the fauces. He recovered. The girl was under treatment much earlier; there was less local mischief, but more constitutional disturbance. She died. The mother and nurse had small white patches on the fauces, and also a servant, who was borrowed for the occasion. Two other servants, and the father, who did not attend to the child, escaped. In another house, three adults had slight sore throat, one showing small white patches. The treatment consisted in frequent application of dilute hydrochloric acid, tincture of sesquichloride of iron, emetics, wine, etc."

*Canterbury.*—During the past quarter, in a population, according to the last census, of 18,398 inhabitants, there have been twenty-four deaths from zymotic diseases; viz., eleven in June; eight in July; and five in August. Of these deaths, two were caused by hooping-cough; six by fever; four from diphtheria; five from measles; two from scarlatina; two from diarrhœa; one from syphilis, an infant three weeks old; and two from variola, aged respectively six weeks and two years, both unvaccinated.

*Chatham.*—Dr. Brown writes: "Stomatitis and diphtheria have been very prevalent. Small-pox has occurred as an epidemic of some severity. Idiopathic peritonitis has killed several persons during the past quarter. The average duration of the disease was four days. There have been a few cases of phlegmasia dolens, but none of metria. Nephritis was prevalent in June. A man died in the week ending June 25th, of spinal meningitis of five days duration, and of purpura of two days duration. His illness was attributable to insolation. A woman died in the week ending August 27th, of tetanus, of sixty-one hours duration. She had old ulcers about the knee. The cause of the attack was unknown."

*Putney.*—Mr. Whiteman writes: "The past quarter has been characterised by the prevalence of diarrhœa to some considerable extent, though no cases of very great severity came under treatment. Scarlatina, which had all but disappeared at the commencement of the quarter, and was absent during nearly the whole of June, July and August, again showed itself at the termination of the last named month, and still continues. Several cases of malignant sore throat in young children occurred during the quarter, but the malady was confined to one family, and to one house at Roehampton, a very dry and elevated locality. Two of the children first attacked died within a very short time of the invasion of the disease. In each of these two fatal cases there was noticed an abscess in

the pharynx, and in the first case it was so certified as the immediate cause of death by the surgeon who attended. All the other cases (five in number) came under my own observation and treatment, and in each of them I noticed, besides a highly congested state of the fauces, sloughing of the tonsils and some ulcerative patches about the mouth. No eruption of any kind, however, was observed either to precede or accompany the disease. In the treatment of the four children who recovered, the nitrous acid gargle was employed with excellent effect. The mortality of this parish during the past quarter was very considerably below the average."

*Hawkesbury Upton.*—Mr. Cox writes: "The small-pox was brought here during May by a visitor from Bath, where the epidemic was very prevalent. The cases here were happily limited to five; all in one house. The greatest precautions were successfully taken to prevent its spread. One of the cases was that of an infant, aged ten months, who had been vaccinated four days before the onset (rigor and sickness) of the variola. The vaccine vesicle was, nevertheless, fully developed, and the two diseases ran their course for a certain time together. None of the cases proved fatal. Hooping-cough has been the most prevalent epidemic during the quarter. I have had fifty-two cases under treatment; three of which proved fatal, from the supervention of pneumonia. The cattle and sheep in this district have been quite free from epizootic maladies. Vegetation has been generally healthy, and the potatoe disease has not yet visited us. The temperature during June 12th to 22nd, and August 14th to 26th, was very high."

*Colchester.*—Mr. Laver says: "Scarlatina has been prevalent this quarter; but most of the cases have been slight. Small-pox has occurred in a few isolated cases: I have not heard of any fatal results. Typhoid fever has been prevalent, but not to so great an extent as in the corresponding quarter of last year. There have been a few cases of diphtheria. Altogether this quarter has been unusually healthy. Potatoes are much diseased; otherwise vegetation is healthy."

*Aspley Guise.*—Dr. Williams says: "The past quarter has been very healthy generally; and, though June was two degrees above the average of several years, July two degrees, and August one degree below the average, the weather was very stormy and changeable. As a consequence, catarrh, and one bad case of influenza, ensued. There have also been a number of slight cases of simple cynanche tonsillaris, evidencing the same epidemic influences, modified by a dry healthy locality; but no real case of diphtherite occurred, though it seems to

have prevailed severely in many parts of England. Two cases at Ridgemount, of a modified character, ended favourably. They originated within a few yards of the spot where cholera broke out in 1854. The locality in question is entirely undrained, and infiltrated with the soak of the village, which in a porous soil gives off very unwholesome exhalations during hot weather. Added to this, the sleeping rooms thereabout are very small and insufficiently ventilated; over-crowding exists to an improper and dangerous extent."

*Saffron Walden.*—Mr. Stear says that the quarter was very healthy; but pleurisy and pneumonia were as prevalent as in winter, depending upon the great and sudden alternations of temperature in the district during the quarter.

*Wellingborough.*—Mr. Dulley states that this neighbourhood has been singularly free from illness of any kind.

*Thetford.*—Mr. Bailey sends the following report of diseases for the quarter, ending August 27:—"June. We have not experienced for many years so uniform a state of high temperature as in this month; the maximum being on the 16th, at 90°, and the evenings seldom lower than 65°. The barometrical range deviated very little, which may be attributed to the absence of wind. The fall of rain was only 0·3 of an inch; and the mean of dew-point throughout the month as high as 60°. Distant thunder was heard on the 9th, and only one thunder-storm was experienced on the 17th, when the greatest quantity of rain fell. The nights were also very oppressive, oftentimes as high as 74°. During the last week, a sudden change was felt, by the temperature falling in the middle of the day to 74°; and at night, on the grass, to 39°. To the little deviation of temperature and atmospheric pressure, we may attribute the few diseases which came under notice in this month, depending upon atmospheric influence. No specific epidemic occurred. A solitary case of croup in a boy of six years of age came under treatment; but he ultimately recovered. Catarrhs and influenza were more prevalent, attacking elderly people. Erysipelas has been more general the last year than in any previous year; during this month, five cases came under medical treatment, and in two instances seemed contagious, During the greatest heat of the month, two cases of ague were taken to the union workhouse, of labouring men, who worked late in the evenings; they soon recovered. One case of typhus occurred in a labouring man of intemperate habits; it ran a long course and ultimately recovered, leaving the greatest prostration of strength. With the casual cases, a very severe case of hæmorrhagic purpura came under notice

with hæmoptysis: the whole body was covered with petechiæ. Rheumatism, diarrhœa, hepatitis, cynanche tonsillaris, paralysis, and hysteria, were observed.

"July. The thermometrical range was that of a summer month, ranging between 60° and 80°, with the exception of two days, when it rose to 84° and 86°. From the wind being generally in the north, with frequent showers during the month, the temperature did not exceed 70°. The atmospheric pressure was more fluctuating than last month, from the frequent winds and showery weather. The quantity of rain fallen in the month was 243 inches; and the dew point was 57°. But few diseases occurred during the month; no epidemic. Catarrhs were still prevalent; and only one case of influenza occurred in an old lady, and erysipelas of a slight kind occurred in a girl; she had been subject to it from any slight cause. Diarrhœa was more prevalent, attacking children and adults in some cases very severely. Rheumatism and bronchitis were under treatment; and one case of diphtheria occurred in a child. The casual complaints under care, were anasarca, hepatitis, pleurodynia, carditis, amenorrhœa, urethal stricture, hysteria, cystorrhœa, lumbago, and nephralgia.

"August. During the first half of the month, we had a high temperature ranging between 70° and 86°; and the mean of the dew point between 53° and 64°. Some sudden deviation of temperature took place, which I have observed for a series of years to occur when the planet Herschel has been in aspect or conjunction with other planets. In this month, it was remarkably so. On the 15th and 16th, the temperature was reduced 12° to 14° under such planetary aspect; after which it rose on the 18th to 81°, and the dew point to 64°. In the evening a most terrific thunder-storm passed over us from the east, lasting three hours, and accompanied by half an inch of rain. From this time to the end of the month, the temperature became cooler, ranging between 55° to 68°. This sudden change gave us an increase of catarrhal affections, and influenza became more prevalent. Bronchitis in children was also more general. Scarlatina still continued, attacking several children, and those convalescent, from exposure were affected with glandular anasarcous swellings. Several cases of diphtheritis came under medical care, occurring in children, the sloughs being extensive and the fœtor great. One death took place in a child three years of age. Ague in the working-men increased, especially in those who had been at harvest in the fens; and pleurodynia also. Diarrhœa was, especially the last week, very prevalent, attacking all grades and producing ex-

treme prostration in children; some deaths have occurred. For some years I have not known typhus so frequent at this season of the year, not confined to the labourer, but attacking those of high station. It commenced with diarrhœa, much fever, brown tongue, and the greatest debility I ever witnessed. It runs a long course, and a slow recovery takes place. Croup attacked a child the last week in this month, from imprudent exposure late in the evening; and its recovery is doubtful.

"I find but little disease among the cattle. The sheep are particularly healthy. Vegetation has been very forward. Potatoes are less diseased. The harvest is finished in this locality."

*Record of Deaths in Twenty-one Parishes (population 9,574) from the Registrar's Book.*

| *June.* | | *July.* | | *August.* | |
|---|---|---|---|---|---|
| Consumption | 2 | Consumption | 2 | Typhus | 1 |
| Pneumonia | 1 | Diseased heart | 1 | Scarlatina | 2 |
| Diseased heart | 1 | Paralysis | 1 | Diseased heart | 2 |
| Hemiplegia | 1 | Convulsions | 2 | Convulsions | 1 |
| Cancer uteri | 2 | Diarrhœa | 1 | Diseased liver | 1 |
| Dropsy | 1 | Exhaustion from labor | 1 | Atrophy | 1 |
| Debility | 1 | Dropsy | 1 | Debility | 2 |
| Decay of nature | 2 | Debility | 3 | Decay of nature | 2 |
| Accident | 1 | Decay of nature | 6 | | |
| Suicide | 1 | Accident (rup.of blad.) | 1 | | |
| | 13 | | 19 | | 12 |

*Barrowden.*—Mr. Swann writes: "In June, the weather was exceedingly hot; July came in very cold; the latter part, and the first part of August, were excessively hot. A few cases of diarrhœa occurred, but nothing in comparison to the same quarter of last year. The prevailing disease was ague, which occurred to an extent previously unknown in this neighbourhood. Small-pox has left this district. Scarlet fever has broken out again at North Luffenham in a very malignant form. I do not hear of the potatoes being diseased at present."

*East Dereham.*—Dr. Vincent can only account for the number of cases of ague (here a very rare disease) by the drying up of the various ponds in consequence of the long continued drought.

*Pontesbury.*—Mr. Eddowes writes: "The only case of small-pox in this neighbourhood, during the present quarter, was imported from Bath. Capt. ——, Royal Navy, and his wife, came here on a visit to his uncle, the Rev. ——. He had been here just a week when he was seized with it; he had it severely, but recovered. I vaccinated his uncle, who is in his 71st year; he had had small-pox upwards of sixty years ago by inoculation: the cicatrices were quite visible. The vaccination took effect, but there was not a genuine vaccine vesicle. It was six weeks before it healed up. The skin of both hands and feet exfoliated. I revaccinated his niece and all the

servants, and the Captain's wife; some of them took effect, others did not. They all escaped the small-pox. At the same time I vaccinated the Rev. ——; he had had small-pox in the natural way upwards of fifty years ago. His took effect; he had a genuine vaccine vesicle, which went through the regular stages. Seven weeks elapsed before the scabs fell off; the cicatrices are very distinct."

*Burton-on-Trent.*—Dr. Thomson writes: "Small-pox, after occurring in a series of scattered cases for some months, has completely disappeared from my country district; no fatal case having presented itself. The case of ague reported was a mild tertian, occurring in a lady who had formerly suffered from the disease when resident in Lincolnshire, and who, after three years absence, had revisited her old place of abode. The disease manifested itself after her return to this neighbourhood, but quickly yielded. Towards the end of the quarter diarrhœa and typhoid fever have become prevalent, especially since abundant moisture has succeeded a long period of drought. Mushrooms are more abundant than for some years past."

*Hawarden.*—Dr. Moffat writes that potatoe disease was first observed on June 27th. There was a great increase in the potatoe disease on August 30th.

*Alford.*—Dr. West writes: "We have had a great deal of remittent fever and typhus throughout the quarter; during the latter weeks more or less complicated with diarrhœa and sore throat. The autumnal diarrhœa will now, probably, take the place of the fevers, which, caused probably by malarious influences during the late dry season, when all drains are stagnant pools instead of being running streams, will, now that rain has at length come, gradually, it is hoped, leave us altogether. Diphtheria, too, which had been frequently, in a slight form, a complication of some of the fever cases, seems likely to assume the dignity of a distinct malady; while the epidemic influence which has caused it, will probably bring us a supply of its cognate disease, scarlatina, to take its place. Hooping-cough, followed in many instances by measles, has prevailed during the whole of the quarter."

*Gainsborough.*—Dr. Mackinder says: "We have just passed over what may fairly be considered the most healthy quarter of the year. The most common diseases have been hooping-cough and affections of the air-passages. Diarrhœa has been much less frequent than usual, and generally of a bilious character, with colicky pains; though we have had a few cases of a more aggravated nature, with choleraic purging, cramps, and slight collapse. One, on the 22nd of August, had suppression of urine for twelve hours. On the 18th of June all the boys,

family, and servants, in a large school were attacked with diarrhœa, before 6 A.M., presumedly from suppressed cutaneous exhalation, the thermometer having run down thirteen degrees in forty-eight hours. All recovered quickly with domestic treatment. Small-pox has been again introduced. The first case occurred on July 24th. Three weeks previously, in consequence of the sudden death of her sister (the mother of the child first seized), a young woman came from Walesby,—a village about seventeen miles hence,—where the small-pox was prevalent. She had had it badly, and had left a sister suffering from the same disease, neither of them having been vaccinated. This person states that nearly all the affected were adults. Those who had been vaccinated had it mildly, those unvaccinated severely, and some paid the penalty of parental neglect by a forfeiture of their lives. Thus then, after an incubation of three weeks, the infection having been conveyed by a person who had been afflicted with the disease a month before, the small-pox first manifested itself in a little child seven years old, who had been vaccinated. It was a good specimen of the discrete form. Another vaccinated child in the same family sickened, but escaped; while a third member, whom the kind father would not allow to be vaccinated, passed through the various stages of the malady. Several children in the neighbourhood have been affected; the vaccinated ones had it very mildly, some having only a few pocks; the unvaccinated had it severely, one case being confluent. We have now a case under treatment. It is high time more vigorous measures were taken to prevent the extension of this formidable disease. A period ought to be fixed, before which no one convalescing from small-pox ought to be permitted, however severe it may seem, to go abroad. Certainly not with the highly tinted evidence of variolous pustulation impressed, like a brand of dishonour, on every square inch of the exposed surface of the body. This is the second time small-pox has been introduced into Gainsborough by imprudent and morally censurable people. As in the former invasion, so in this, I hope, preventive measures, vaccination and seclusion, will soon prove an effectual barrier to the progress of the intruder. A haymaker fell down from sunstroke a few minutes before ten on the morning of June 22nd. The sky was unobscured, and the thermometer standing at 112°. He recovered, and resumed his work in the course of a day or two, but is now suffering from suspicious cephalic disease. One woman died suddenly, seventeen days after an ordinary labour, from presumed occlusion of some arterial or venous channel. There were no premonitory symptoms; she was *in extremis*

when seen; a *post mortem* examination was not allowed. Another woman had a severe attack of puerperal mania, forty-seven days after a normal confinement. She did well. A third died of intrauterine hæmorrhage at the eighth and half month from conception. When first seen she was in a state of icy collapse, from which she never rallied. No external bleeding. The *post mortem* examination revealed an absolutely bloodless condition of the whole body and viscera; but within the uterus, and between the decidua, was an immense clot of blood, forming a thick stratum on the parental surface of the placenta. The decidua formed a *cul-de-sac* from which not a single drop of blood had escaped. This poor woman had had a large family, and had been half-starved for some time, but would not confess her poverty. Her enfeebled state was, doubtless, the predisposing, and the lifting of a heavy weight the exciting cause of her sudden death. One child died suddenly from epileptoid convulsions. The necropsy showed recent and remote endocranial mischief, with a highly congested condition of the kidneys, liver, and pancreas. We have still a few cases of throat affection, all of a mild character and soon relieved by appropriate treatment. Eighty-seven paupers were attended as fresh cases during the quarter, thirty-two in June, twenty-eight in July, and twenty-seven in August. Of these, eleven were between 60 and 70 years old; twelve between 70 and 80; and four between 80 and 90 years old. Two females had each attained the age of 89. One of them died of diarrhœa, and the other is recovering from a fracture of the neck of the thigh-bone; an accident of common occurrence here, and one that generally does well, the sufferers regaining the full powers of their limbs. One hundred and seventy-three pauper cases were attended in the quarter ending May 28; *minus* one of double the number that have been attended this past quarter.

"Herewith, I have sent an account of the births and deaths of the quarter, for the township of Gainsborough, kindly granted by the registrar, Mr. Brownlow." (See p. 311.)

The subjoined meteorological report has been furnished by Mr. Dyson:—"The barometric pressure during the month of June, till the 19th, was variable, and storms of thunder, lightning and rain, were frequent; the remainder of the month was unceasingly fine. Wheat was in ear as early as the 8th, and in flower on the 13th, nearly a fortnight sooner than the average. The first wheat was cut on the 26th of July, and the harvest became general immediately afterwards; very nearly the whole of the abundant wheat-crop was housed before the 1st of September, and in fine condition. Very fine weather prevailed throughout July and August. The tempe-

rature reached 92° on the 16th of June, 85° on the 24th of July, and 89° on the 12th of August. The coldest nights were 41° on the 27th of June, 43° the 19th, 29th, and 31st of July, and 45° on the 25th of August. The average fall of rain in the year, is 24 inches, and very little more than 6 inches had fallen in the first six months. In June, 1·54 inch fell; in July, 2·62; and in August, 2·42, of which more than one inch fell in the night of the 18th. Generally, the weather during the quarter has been unusually fine, and all cereal crops were most prolific; but the bean-crop was, generally, a complete failure."

*Warrington.*—Mr. Spinks states that the season has been unusually healthy.

*Wigan.*—Mr. Hussey writes: "Measles and hooping-cough have prevailed to as great an extent in this locality of late as scarlet fever did after the last cholera epidemic. The mortality in both has been very marked, owing to the little patients yielding to inflammatory chest disease in the former and head symptoms in the latter; for the most part, however, through neglect in not seeking timely advice. The most remarkable feature in these diseases is, that a great number of the children laboured under both, *i.e.*, measles and hooping-cough, at one and the same time, the latter proving fatal in proportion to the severity of the former: in fact, in severity they have gone hand in hand. And the measly eruption, I have noticed, did not prove, as it does when the disease is uncomplicated, *a full crop.* One of my juvenile patients (vaccinated by myself two years ago) passed into varioloid out of a severe attack of simple scarlatina, in which the arms and forehead were studded with large miliary vesicles. So large, indeed, were the latter, that at first sight I mistook them for drops of sweat. Diarrhœa of a severe character, with vomiting and cramps, and dejections rice-water like, has been very common of late; and, for the most part, I could not trace the disease to errors in eating or drinking. Its recurrence this season has dated from the beginning of the last change in the weather, which has been cloudy, with occasional heavy rains. Wind principally from the north. The sickening emanations from cesspools during the heat of the last quarter, as evidenced by the sense of smell, have had much to do, I fear, with infantile diseases. Query, has the emptying of cesspools in the night time, when people are asleep, any material bearing upon the propagation of disease? Close by one of these, a woman lately died of phthisis; a child in the same house is fearfully scrofulous; and a young man, a patient of mine in the next house, is at the present time likely to die of phthisis."

*Township of Gainsborough (population in* 1851, 7,261). *Deaths from May 29th to August 27th,* 1858, *inclusive.*

| Date. | Age. | Sex. M. | Sex. F. | Occupation. | Cause of Death. |
|---|---|---|---|---|---|
| My.30 | 1 yr. | 1 | — | S. of joiner | Pertussis |
| June1 | 3 wks. | 1 | — | S. of domestic servant | Marasmus |
| „ | 1 yr. | 1 | — | S. of cordwainer | Pertussis |
| 4 | 50 „ | — | 1 | W. of publican | Softening of the brain |
| 7 | 56 „ | — | 1 | W. of labourer | Disease of liver, jaundice |
| 10 | 1 „ | — | 1 | D. of tanner | Pertussis, pneumonia |
| 13 | 5 „ | 1 | — | S. of publican | Bronchitis, pertussis, tabes me- |
| 14 | 52 „ | 1 | — | Labourer | Phthisis [senterica |
| 15 | 41 „ | — | 1 | W. of butcher | Carcinoma of stomach |
| 16 | 76 „ | 1 | — | Tailor | Atonic apoplexy |
| „ | 50 „ | — | 1 | W. of ironmonger | Cancer uteri |
| 21 | 86 „ | — | 1 | W. of joiner | Paraplegia |
| 22 | 1 „ | — | 1 | D. of joiner | Pertussis, dysenteria |
| „ | 63 „ | — | 1 | W. of labourer | Bronchitis |
| 23 | 1 „ | 1 | — | S. of single woman | Manslaughter* |
| 27 | 10 mo | — | 1 | D. of labourer | Decline from birth† |
| 28 | 8 „ | — | 1 | D. of blacksmith | Bronchitis, pertussis |
| 29 | 9 wks | 1 | — | S. of dressmaker | Sec. syphils, cong. of right lung, granular disease of kidney‡ |
| July 3 | 6 „ | 1 | — | S. of merchant | Collapse of the lung |
| 4 | 19 yrs | 1 | — | Tailor | Phthisis |
| „ | 29 „ | — | 1 | W. of staymaker | Hyperlactation & mental emotion, presumed clot in heart |
| „ | 82 „ | 1 | — | Cordwainer | Diarrhœa |
| 5 | 69 „ | — | 1 | Dressmaker | Paraplegia |
| 6 | 6 „ | — | 1 | D. of joiner | Pneumonia, dysentery |
| 7 | 71 „ | — | 1 | W. of seaman | Fracture of femur, bedsore, etc. |
| 10 | 52 „ | — | 1 | W. of labourer | Diarrhœa |
| 11 | 81 „ | — | 1 | W. of cottager | Disease of heart |
| 13 | 2 „ | 1 | — | S. of domestic servant | Bronchitis |
| 17 | 8 mo | — | 1 | D. of waterman | „ |
| 20 | 90 yrs | — | 1 | W. of coal-porter | Diarrhœa |
| 21 | 73 „ | 1 | — | Weaver | Valvular dis. of heart, diarrhœa |
| 23 | 3 „ | — | 1 | D. of boatman | Meningitis |
| 27 | 73 „ | — | 1 | W. of cordwainer | Old age† |
| 28 | 5 wks | — | 1 | D. of staymaker | Inanition, dysentery |
| „ | 3 „ | — | 1 | D. of labourer | Convulsions |
| 29 | 1 yr. | 1 | — | S. of waterman | Pertussis, tabes mesenterica |
| Aug.3 | 88 „ | — | 1 | W. of labourer | Decay of nature |
| 4 | 10 dys | 1 | — | S. of baker | Premature birth |
| 8 | 77 yrs | — | 1 | W. of coal-measurer | Natural decay |
| 9 | 33 „ | 1 | — | Whitesmith | Phthisis |
| 10 | 55 „ | 1 | — | Retired joiner | Gangrena senilis |
| 11 | 6 dys | 1 | — | S. of woollen draper | Premature birth |
| 12 | 57 yrs | 1 | — | Innkeeper | Gastro-enteritis |
| „ | 3 mo | 1 | — | S. of carpenter | Marasmus |
| 13 | 7 yrs | — | 1 | D. of cabinet maker | Encephalitis |
| 16 | 8 „ | — | 1 | D. of seaman | Epileptoid convulsions, congestion of kidneys, arachnoid membrane with old adhesions‡ |
| 19 | 40 „ | — | 1 | W. of general dealer | Intrauterine hæmorrhage‡ |
| 20 | 80 „ | 1 | — | Labourer | Bronchitis senilis |
| 21 | 19 „ | — | 1 | Domestic servant | Phthisis |
| 27 | 3 wks | 1 | — | S. of pork butcher | Atrophy |
| Total .... | | 22 | 28 | = 50 | |

* Certified by coroner. † Cause of death not certified. ‡ Certified after *post mortem.*

Two of the deaths and three of the births occurred in the workhouse. The number of births during the same period were 28; viz. males 16, females 12. The total of births registered in the quarter is much below the average.

| Treatment commenced. | Diseases of Private Patients. | Diseases of Pauper Patients. | Barometric pressure at the temp. of 32° Fahr. | Temperat. Dry bulb. | Temperat. Wet bulb. | Direction of Wind. | Rain in 24 hours. | Ozone. (Schoen.) | Remarks. |
|---|---|---|---|---|---|---|---|---|---|
| May 29 | Pertussis, bronchitis, emphysema | Phthisis, lumbago | 30·088 | 56 | 52 | SW. | ·11 | — | Clear |
| 30 | Sclerotitis, tabes mesent., hoop.cough, tonsillitis, bronchitis | | 30·012 | 69 | 60 | W. | ·0 | 2 | „ |
| 31 | Hoop.cogh., diar., bronchitis, stomatitis | Phthisis, amenorrhœa | — | 73 | 64 | S. | ·0 | — | „ |
| June 1 | Dyspepsia, bronchitis [ulcerosa | Catarrh, bronchitis, amenorrhœa | 30·028 | 70 | 62 | W. | ·0 | — | „ |
| 2 | Diarrhœa | Amenorrhœa, eczema impetiginoides | 30·079 | 68 | 62 | NW. | ·59 | 3 | Thun., lg., & |
| 3 | Catarrh, gastritis | Hæmaturia, diarrhœa, anasarca | 29·949 | 63 | 62 | SE. | ·02 | 4 | Fine [rain |
| 4 | | Catarrh, anasarca | 30·052 | 67 | 58 | SW. | ·0 | — | „ |
| 5 | Dysmenorrhœa, pemphigus, leucorrh. | Scabies, colic | 30·087 | 59 | 56 | S. NW. | ·0 | — | „ |
| 6 | Vermes | | 30·145 | 68 | 59 | NW. N. | ·01 | — | Thunder |
| 7 | Neuralgia | Diseased heart, incipient paralysis | 30·169 | 57 | 54 | NE. | ·0 | 5 | Fog |
| 8 | | Catarrh, colic, hæmorrhoids | 29·989 | 65 | 48 | E. | ·0 | 5 | Wheat in ear |
| 9 | | Colic, stomatitis, dyspepsia, catarrh | 29·906 | 64 | 63 | N. | ·16 | 10 | Thund. & lg. |
| 10 | Urticaria, diarrhœa | Faucitis, bronchitis, phthisis | 30·109 | 68 | 61 | N. | ·0 | 2 | Fine |
| 11 | Neuralgia | Curvature of spine, neuralgia | 30·024 | 68 | 61 | NE. | ·0 | 7 | „ |
| 12 | Hæmorrhoids, catarrh, bronchitis, diarrhœa with cramps | Neuralgia | 29·960 | 59 | 57 | E. | ·44 | 10 | Thn., lg. & rn. |
| 13 | Hooping cough, urticaria, dysentery, diarrhœa, dyspepsia | Colic | 29·905 | 69 | 64 | S. | ·04 | 10 | Fine, wheat in flower |
| 14 | Pleurodynia, bronchocele, hæmorrhoids, cramps from hyperlactation | Paralysis, phlegmasia | 29·856 | 74 | 68 | SE. | ·0 | 4 | „ |
| 15 | | Syphilis | 29·984 | 79 | 69 | S. | ·0 | 3 | „ |
| 16 | Colic, bronchocele | Bronchitis, hæmorrhoids | 29·932 | 80 | 71 | N. | ·0 | 6 | Dist. thund. |
| 17 | | Syphilis, adenitis, diarrhœa | 29·702 | 72 | 68 | N. | ·09 | — | Fine |
| 18 | Dysentery, diarrhœa | | 29·979 | 63 | 58 | N. | ·0 | 4 | „ |
| 19 | Stomatitis | Pityriasis, dysentery | 30·053 | 72 | 61 | NW. SW. | ·20 | — | Fog, fine |
| 20 | Conjunctivitis, measles, gingivitis | | 30·096 | 72 | 62 | NW. | ·0 | 10 | Fine |
| 21 | Neural., congestio cerebri, diar., dysen. | Adenitis, carbuncle | 30·268 | 69 | 62 | NE. | ·0 | — | Fog, fine |
| 22 | Sun stroke, parotitis, aphtha | Eczema impetiginoides | — | — | — | — | ·0 | — | Clear to end |
| 23 | Menorrhagia | Bronchitis, diarr., abscess of abdomen | — | — | — | — | ·0 | — | of month |
| 24 | Herpes, menorrhagia, colic, scarlatina | Pleurodynia | — | — | — | — | ·0 | — | |
| 25 | Scabies | | — | — | — | — | ·0 | — | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 26 | | Acne | — | — | — | — | ·0 | — | |
| 27 | Diarrhœa, hooping cough | | — | — | — | — | ·0 | 4 | |
| 28 | Hyperlactation, psoriasis, paralysis | | — | — | — | — | — | — | |
| 29 | | Pleurodynia, diarrhœa | — | — | — | — | — | — | |
| 30 | Diphtheria | Synovitis | — | — | — | — | — | — | |
| July 1 | Amenorrhœa, furuncle, scabies | | 30·065 | 61 | 52 | NW. | ·0 | — | |
| 2 | | | — | 59 | 52 | NW. | ·0 | — | |
| 3 | Hooping cough | | — | — | — | — | ·0 | — | |
| 4 | Hooping cough, colic | | — | — | — | — | ·05 | — | |
| 5 | Diarr., dyspepsia, gravel, pleurodynia | | — | — | — | — | ·0 | — | |
| 6 | Uterine hæmorrhage, pleurodynia, emphysema, bronchitis | Vertigo, diarrhœa | — | — | — | — | ·0 | — | |
| 7 | Orchitis, catarrh, menorrhagia, diarr. | Diarrhœa, parotitis | — | — | — | NW. | ·03 | 10 | Fine |
| 8 | Paralysis, diarr., lumbago, psoriasis, | | 29·760 | 55 | 54 | NW. | ·54 | 10 | Heavy rain |
| 9 | Ophthalmia, epistaxis [neuralgia | Aphtha | 29·937 | 58 | 53 | NE. | ·01 | 10 | Fine to 24th |
| 10 | Corneitis, œdema, hæmorrhoids, scar- | | 29·940 | 63 | 56 | N. | ·0 | 10 | |
| 11 | Pleurodynia [latina, varicella | Colic | 30·083 | 72 | 60 | N. | ·11 | — | |
| 12 | Pleurodynia, colic | Bronchitis | 29·913 | 68 | 64 | S. | ·0 | — | |
| 13 | Anæmia, faucitis, amenor., emphysema | | 29·885 | 75 | 65 | S. | — | — | |
| 14 | Dyspepsia, diarrhœa, hæmorrhoids | Dentitis, imbecility, colic | — | 68 | 64 | S. | ·14 | — | |
| 15 | Intercostal neuralgia, faucitis | | 29·881 | — | — | — | — | — | |
| 16 | Febricula | Diarrhœa, scabies, morbus coxarius | — | — | — | ch. | ·92 | — | |
| 17 | Dyspepsia | Rupia | 29·863 | 64 | 60 | N. | ·01 | 10 | |
| 18 | Cataract | Insanity | 30·063 | 66 | 61 | N. | ·04 | — | |
| 19 | Diarrhœa with vomiting, colic | Lumbago, erysipelas, diarrhœa | 30·160 | 68 | 59 | W. | ·0 | — | |
| 20 | Faucitis, purulent ophthalmia | Neuralgia, rheumatism | 29·971 | 73 | 62 | NE. SE. | ·33 | 10 | |
| 21 | Dysentery | Anæmia | 29·729 | 59 | 57 | SE. W. | ·0 | — | |
| 22 | Pleurodynia | | 29·870 | 65 | 59 | SW. | ·01 | — | |
| 23 | | Pleurodynia, strumous ophthalmia | 29·729 | 72 | 61 | SW. | ·03 | — | [rain |
| 24 | Variola | | 29·771 | 72 | 63 | SW. W. | ·18 | — | Boisterous w. |
| 25 | | Dysentery, diarrhœa, anasarca | 29·225 | 53 | 52 | SE. W. | ·22 | — | Clear and |
| 26 | Faucitis, rheumatism, parotitis | Periostitis | 29·801 | 63 | 54 | W. | ·0 | — | fine to Au- |
| 27 | Menorrhagia, enlarged liver | Anasarca, hydrops | 29·855 | 63 | 58 | NE. | ·0 | — | gust 10th |
| 28 | Conjunctivitis | Choleraic diarrhœa | 29·845 | 62 | 55 | NE. | ·0 | — | |
| 29 | Amenorrhœa, catarrh | Congestio cerebri | 29·970 | 62 | 56 | NE. | ·0 | — | |
| 30 | | Diarrhœa, ascites | 30·000 | 64 | 57 | N. | ·0 | — | |
| 31 | Dyspepsia | | 30·153 | 66 | 57 | NW. | ·0 | — | |

| Treatment commenced. | Diseases of Private Patients. | Diseases of Pauper Patients. | Barometric pressure at the temp. of 32° Fahr. | Temperat. Dry bulb. | Temperat. Wet bulb. | Direction of Wind. | Rain in 24 hours. | Ozone. (Schoen.) | Remarks. |
|---|---|---|---|---|---|---|---|---|---|
| Aug. 1 | Abortio | | 30·187 | 67 | 58 | N. | ·0 | 8 | |
| 2 | Leucorrhœa [pepsia | Rheumatism | 30·044 | 63 | 57 | E. | ·0 | — | |
| 3 | Colic, valvular disease of heart, dys- | Puerperal mania | 29·718 | 66 | 59 | SE. | ·0 | — | |
| 4 | Angina pectoris, faucitis, encephalitis | | 29·893 | 70 | 63 | W. SW. | ·08 | 3 | |
| 5 | Bronchitis, pustular ophthalmia, gas- | Colic, lumbago | 29·863 | 65 | 58 | W. | ·0 | — | |
| 6 | Diarrhœa [tritis, dysuria | Dyspepsia, dysuria | 30·038 | 64 | 57 | W. NW. | .01 | — | |
| 7 | „ , congestio mucosiæ, poisoning by prussic acid in the process of photography | | 30·368 | 69 | 58 | N. ch. | ·0 | — | |
| 8 | Gastrodynia, phthisis | Bronchitis | 30·461 | 74 | 62 | NE. | ·0 | — | |
| 9 | Ulcer of bowel, pleurodynia, scarlatina, | Dyspepsia, bronchitis | 30·297 | 65 | 59 | E. | ·0 | 3 | |
| 10 | Ulcus uteri [febricula | Colic, catarrh | 30·132 | 65 | 60 | NE. | ·0 | 2 | |
| 11 | Sciatica, encephalitis, febris, hooping cough, anasarca | Adenitis, emphysema | 30·057 | 63 | 60 | NE. | ·10 | 5 | Rain |
| 12 | Diarrhœa, stomatitis | Catarrh | 30·003 | 67 | 64 | NE. | ·14 | — | Thun., lg., & |
| 13 | | Leucorrhœa, congestio cerebri, syphilis | 29·949 | 64 | 60 | NW. | ·53 | — | heavy rain |
| 14 | | Diarrhœa | 29·967 | 62 | 58 | — | ·0 | — | Fine to 22nd |
| 15 | Faucitis, hooping cough | | 29·919 | 68 | 60 | NW. | ·0 | 6 | |
| 16 | Meningitis, nephritis, anæmia, anasarca | Syphilis, inflamed absorbents of arm | 29·970 | 70 | 63 | S. | ·0 | 8 | |
| 17 | Neuralgia, faucitis, dysuria, bronchitis, hooping cough | Amenorrhœa, rheumatism, diarrhœa, English cholera | 29·802 | 70 | 62 | SE. | ·02 | 10 | |
| 18 | Diarrhœa, carbuncle, variola, intra-uterine hæmorrhage | Rheumatism, vertigo | 29·719 | 69 | 62 | SE. | 1·03 | 10 | |
| 19 | English cholera, hooping cough, faucitis, pustular ophthalmia | Hooping cough | 29·605 | 72 | 68 | NE. | ·0 | — | |
| 20 | Cellulitis, menorrhagia, epistaxis | Hooping cough, gonorrhœa | 29·761 | 62 | 59 | W. | ·04 | — | |
| 21 | Faucitis, diarrhœa, cephalagia, dentitis | Stomatitis, lumbago | 29·810 | 58 | 54 | NW. | ·29 | 10 | |
| 22 | „ , colic | Diarrhœa, English cholera | 29·895 | 65 | 63 | NW. | ·0 | 7 | |
| 23 | | Prurigo | 30·027 | 65 | 61 | NE. | ·0 | — | Fog, fine |
| 24 | Leucorrhœa, anasarca | Erysipelas | 30·110 | 65 | 62 | NW. | ·0 | — | „ „ |
| 25 | Hæmorrhoids | | 30·012 | 62 | 58 | NW. | ·0 | 4 | Fine |
| 26 | Ophthalmia, colic, English cholera | Bronchitis | 30·059 | 55 | 49 | NW. | ·04 | — | „ |
| 27 | Faucitis, glossitis, diarrhœa | Morbus coxarius, tænia | 29·832 | 62 | 55 | NW. | ·04 | — | „ |

*Bolton-le-Moors.*—Mr. Pendlebury writes: "The past quarter has not been a very sickly one on the whole. Small-pox has been (comparatively) the most prevalent disease, and has in a marked manner ferreted out the unvaccinated portion of families, not sparing the adults. Cases of summer cholera have not exceeded the average number. Diarrhœa and dysentery have only been moderately prevalent. The summer has been remarkably fine and dry, with no long-continued heat."

*York.*—Mr. Procter writes: "The health has, in this place, during the quarter, been generally good. Eruptive fevers have been prevalent, but not to an unusual extent. Diarrhœal cases have not been so prevalent as is ordinarily the case at this time of year; and they, as well as the few cases of dysentery which have appeared, have been slight and easy of management."

*Rothbury.*—Mr. Summers says: "That two children, suffering from severe hooping-cough, came to this place from Newcastle, and remained here five weeks, mixing quite freely with other children; but without communicating the disease in any instance."

*Lerwick.*—Dr. Spence writes: "With the exception of the last week, which was rainy, the month of June was unusually fine; and during a fortnight the weather was warmer than had been known in Shetland for some years. The prevailing wind was from the S.W. July was not so fine, being more changeable, with rain, fog, and high winds. The winds were chiefly S.W., but easterly and northerly winds also prevailed. The first fortnight of August was fine, with south-westerly winds: in the last fortnight the weather was changeable, with much rain and fog, and the winds were S., S.E., N., and N.W. The average development of ozone was in June 7.5, in July 6.3, and in August 6.2. In the end of last quarter, and the beginning of this, there were twenty cases of small-pox, exclusive of the man who introduced it: of these ten were unvaccinated; and one death occurred in a boy who was said to have been vaccinated. Measles were imported from Edinburgh in the month of August; only three cases occurred, and they were very slight. There was less than the usual amount of sickness of any kind during the quarter. Ten funerals took place during the quarter, but of these, two were of sailors who died on shipboard; one was of a man who was drowned, and another of a man who was killed by an accidental explosion in blasting. Of the remaining six, the average age at death was 35; one being above 70, and one below 5. The causes were: small-pox, 1; chicken-pox, 1; phthisis, 1; hectic from diseased bone, 1; cancer of the stomach, 1; and debility from old age, 1.

# SANITARY LEGISLATION.

DURING the last session, three Public Health measures have passed into law in England. The first, *An Act to alter and amend the Metropolis Local Management Act* (1855), *and to extend the powers of the Metropolitan Board of Works for the purification of the Thames and the Main Drainage of the Metropolis*, leaves the whole question and action of purifying and draining with the Metropolitan Board. The second, entitled *The Local Government Act*, 1858, is an Act to amend the Public Health Act of 1848, and to allow an extension of the Act of 1848 to the government of towns and populous districts. This Act may be adopted,

1. In corporate boroughs to which the Public Health Act, 1848, has not been applied, by a resolution of the Council assembled at a meeting held for the purpose: provided always, that this Act shall not be adopted in corporate boroughs until after the election of councillors, on the first day of November, one thousand eight hundred and fifty-eight:

2. In other places under the jurisdiction of a Board of Improvement Commissioners, where all or part of the Commissioners are elected by ratepayers, or by owners and ratepayers, by a resolution of such Improvement Commissioners assembled at a meeting held for the purpose:

3. In all other places having a known or defined boundary, by a resolution of the owners and ratepayers:

But no such resolution, passed by any Council or Board of Improvement Commissioners, shall be valid unless a month's previous notice of the meeting, and of the purpose thereof, has been given in manner in which notices of meetings of such Council or Board of Commissioners are usually given, nor unless two-thirds of the members present at the meeting concur in the resolution for such adoption; and it shall be lawful for the chairman of any such meeting, with the consent of a majority of the members present, to adjourn the same from day to day.

The third Act, entitled *The Public Health Act*, 1858, is an Act for vesting in the Privy Council certain powers for the protection of the public health: it transfers the powers previously invested in the General Board of Health, under the "Diseases Prevention Act, 1855", to the Privy Council. The Act is only to be in force until the first day of August 1859.

THE

# SANITARY REVIEW.

## JANUARY 1859.

### LIFE AND LABOUR.*

If the results of the labours of a modern statistical inquirer, Dr. Guy, have indicated by figures the truth of the saying, that man shall live by the sweat of his brow; if it be true, as without doubt it is, that the life is both short and heavy into which labour is not infused,—it is not the less true that the reverse of the rule is in our days a prominent fact, and that labour is the parent of a huge mortality.

It requires an intimate knowledge of the habits and life of the poorer classes, and of the practical working of the businesses upon which these classes depend for subsistence, before even an approach can be made towards the fact of the relationship which exists between occupation and mortality. In some measure the statistics of mere mortality-registers give, it is true, an approximation towards the fact. They shew that some persons of such and such an occupation die of this or that disease, —of phthisis on this hand, or of nervous disease on the other. In this light, statistics of mortality are of great value; yet of a value limited in degree. In them the outward and general expression of a hidden evil is supplied: they are as the index of a book, which gives the names of the subjects considered, but offers none of the argument, and cannot be said even to condense the information.

To arrive at the truth, to know to what extent life and health are sacrificed—and often needlessly sacrificed—to the Moloch toil, the working philanthropist must leave the statist's quarry, and out in the world at large learn for himself, amidst the teeming and sweating millions, how they suffer and how they die, not at, but from, their tasks, and by them. For the fact seems, that those engaged at various occupations are often themselves unaware that the business, by which they are earning their bread, is the guide to their deathbeds. Worn

* The Effects of Arts, Trades, and Professions, on Health and Longevity. By C. T. Thackrah, Esq. London: 1832.

by some chronic malady which disables them from work, they pine out the remainder of their days in the rest enforced by their complaint; or the suffering to which they were first subjected solely from labour becomes, in the end, modified in character, and assumes in disease a new name. Hence, dying at a late period after the last day's work, and from what seems, and often is, a new and acute phase in disease, the death is chronicled in a way which may not in any manner connect the death with its one and primitive cause.

In instituting a rigid inquiry into the question of the influence of occupation on mortality, great difficulties are met with. The evil effects of occupation (often, as we have said, unknown) are still more frequently known, and hidden. The employers of artisans engaged in injurious arts—we mean injurious to the artisans—are not, as a general rule, over-sensitive to the comfort and the safety of the employed; nor are they ready, or at any time willing, to communicate truths which tell against their own plans and business arrangements. The employed, again, even when conscious that they are enduring a daily cross, are timid in giving satisfactory information, which may compromise them with their taskmasters. Or, again, if they are willing to communicate, they are led unintentionally to misrepresentation, like all who are not educated in the art of observation.

The only means that could be taken to expose the dangers of injurious occupations, and to remedy evils which every day seem on the increase, would be, to set to work the machinery of a royal commission of inquiry. Such commission, formed of intelligent men, might well sit for several sessions at their required work. The result of their labours would, we submit, unfold a tale which would make the philanthropic world shudder, and open to it a field of industry regarding which it is, at the present moment, practically ignorant, and towards which it is, of consequence, practically supine.

The only men who are, at this moment, fully alive to the evils of which we write, are the members of the medical profession; and even amongst these there is an apathy from which we would endeavour respectfully to awaken them. We find, in our medical literature, much matter of interest in regard to various causes of disease, but very little in the way of reference to occupation as one of the most common causes of innumerable maladies. Yet we know that members of the medical body have immense stores of knowledge on the subject in hand; and we know that their sympathies are ever kept awakened by the histories of disease and labour which they are constantly forced

to hear. Let us then earnestly summon our great profession to a new work, or rather to a public work; to an exposition made to the world at large, of medical facts on a question of national interest.

The work has, indeed, been briefly opened and reopened for discussion. The book noticed at the commencement of our paper is an instance. Thackrah—a man, if not of genius, certainly of great talent, and of a noble philanthropy—did all he could, with the means he had at command, to awaken public attention to the artisan and the artisan's imposed maladies. Within the last few years, too, the Society of Arts founded a committee for inquiring into "industrial pathology"; but as yet the labours of the committee have borne little fruit; and Thackrah's well meant and able teaching has had but trifling influence on the people at large.

In our own sphere of observation we have of late years been endeavouring to collate certain facts and observations on the subject under consideration. The facts, up to this time, are limited in number, and the space for their communication is necessarily limited also. But such evidence as we do communicate is reliable; and may, to say the least of it, draw the minds of many readers to similar lines of research.

The manufacture of *Sand-Paper* is an occupation which, as we opine, is attended with serious evils. In this occupation the pulverised sand, or pulverised sand and glass, is placed in fine sieves; and, by gentle motion, the powder is equally distributed over paper prepared for its reception. The distribution is done by the hand; and as it is light work, young boys, hardly relieved from leading strings, are employed at it. The result is, that the distributor, from the moment his work commences, is exposed to the inhalation of the irritative dust. A boy was one day brought before us, fatally struck by a chest affection resembling acute pulmonary consumption. On inquiry, we found that the youth, then engaged at the sand-paper business, was in perfect health until the first day he entered on his work. On his return in the evening to his home, he brought with him cough and thoracic pain, which never left him. Quickly the health failed; and when we saw him only three weeks after the commencement of the labour, his chances of life were over. He died within a month. Making further inquiry into this business, we found that this poor youth was the representative of a great class of youths similarly disabled. There were few who ever stood the work. It adds to the shame of these occurrences, that, except in the matter of pecuniary saving in the purchase of young hands, all risk is unnecessary; that by

very simple machinery the manufacturer might dispense with the distribution by hand altogether; and that the particles of irritative powder need never be so distributed through the air as to be breathed either by the manufacturers or their assistants.

*Walking-Stick Making* is another business which carries with it mischiefs little less serious than the above. The sufferers, however, in this case are men; and the mischiefs induced, as described with great exactness and common sense by one of the sufferers, occur as follow. In order to make common sticks assume various colours and shades, the sticks, when turned and ready for colouring, are gently charred over a coke fire. The men engaged in this department suffer severely from the coke fumes. They grow giddy, lose appetite, and are altogether greatly enfeebled. But more serious danger resides in another stage of the process. The stick having been charred externally, the shading begins. The art of this lies in removing, by a fine rasp and by sand-paper, proper amounts of the charred material. An atmosphere charged with pulverised charcoal is thus produced; and the irritative effect of such inhalation on the lungs of the man, begins almost from the first day of the employment. In the man who came under our notice, the symptoms which had long been present were bronchial, but the mischief was so extensive that his life was clearly shortened by it, and a malady never to be removed was on him. He had constant cough, a flux from the lungs charged with the charcoal particles, and great emaciation. By removing from his work on our suggestion, this man made a partial recovery, and is, we believe, still alive.

From such information as we could gather from this man, we learned that the cough incident to the occupation is attended in the first instance with considerable acute suffering; but that by and bye, as the cough loosens, and as a steady expectoration of secretion charged with the sooty matter takes place, the acute symptoms give way to chronic cough and bronchial flux. "It is all right", said our informant, in referring to the charcoal dust—"it is all right when we can cough it up; if a man get into that way he stands his work for many years; but eventually, the cough always masters us, and so we break down."

The remedy against this evil lies probably with the men themselves. We suggested to our informant that a woollen muffler would be a capital filter and protect effectually. "Very simple, sir," was the reply, "but quite impracticable, 'specially in hot weather, when we feel the dust most."

*Hemp and Flax-Dressing* are occupations attended inevitably, as all evidence goes to show, by a series of symptoms, affecting chiefly the bronchial surface, which may be considered specific in kind. We were fortunate, in our inquiries, in having the opportunity of examining an intelligent workman who had been engaged at the business of hemp-dressing and flax-dressing for thirty years; in this time, he had left his work during certain intervals only, in which he had been sick-bound. This man, from the first a sufferer from his occupation, had come into contact, at various times, with many hundreds of men in the same line of life, and he was thus enabled to give us some very correct and extended information. He was quite unbiassed in his narrative; he had great respect for his employers; and so conscientious was he in his statements, that he paid us a special call to correct a slight error into which he thought he had fallen. The experience of this witness is confirmed by that of two others, engaged in the same business at other manufacturers. The history of the dressing process is somewhat as follows.

The raw hemp comes mainly from Russia and Poland. These countries send the finer qualities of hemp. But a coarser variety is imported from Naples, and this variety was largely used during the late war. The first step in the process of dressing, consists in drawing the rough hemp through the "hackle," a machine in large manufactories consisting of benches in which are inserted series of pins close together, in the manner of a comb of many rows. The hemp, taken by lengths weighing about a pound, is drawn first by an overhand movement, through a coarse set of the pins, and then by an underhand movement through a finer series. These acts complete the primary steps of the process, and during these steps the men suffer very severely; during the whole time the air is charged with dust and fluff. Some idea of the extent to which the fluff is dispersed, may be gleaned from the fact, that, of every hundred and twelve pounds weight of hemp employed, there is escape and loss of four pounds in the dressing. The Neapolitan hemp is much the most indifferent in this respect.

The man to whom we referred at the opening of this section was a sufferer from the first, from his employment. He never could become tolerant of it; and at no time could remain longer than three hours at his work, without going out of doors to restore himself with fresh air. He was subject to constant irritating cough and constant expectoration, very profuse in amount. In the course of his labours, he assured us, he had never known a fellow-workman who did not suffer from

the same affection. In some, however, the cough was dry and husky, and even more trying. In country places the workmen suffer less than in London, and in London the work is much more tolerable in warm and dry weather. During fogs, when the fluff cannot find escape freely by currents of air, and when the air itself is of difficult respiration, the labour is hardly to be borne.

There is another curious fact connected with the hemp business which deserves notice. From the Neapolitan hemp there emanates, spontaneously, an odour of a very irritative character; the inhalation of which causes shortness of breath, constriction of the throat, and spasmodic cough in paroxysms. All workmen with this variety of hemp seem susceptible. To satisfy ourselves on this subject, we obtained a portion of Neapolitan hemp which was assumed to have this quality, and soon experienced in our own proper person the truth of the allegations against it. The symptoms caused by it are those of "hay fever," or like the symptoms produced in some persons by ipecacuan. Nor does the dressing of this hemp remove the mischief; for the symptoms are common to the spinners of the dressed variety, although, from working in the air, these are much less exposed to the fluff.

*Flax-Dressing*, which is, in fact, but a continuance of the above process, on a finer kind of hemp, is equally injurious to the workmen, and is even worse, as an occupation, than the dressing of Russian hemp. The loss of fluff in flax-work is nearly the same as in the preparation of hemp.

It is possible that a certain amount of mischief to the lungs must always follow the hemp and flax manufactures. But much of the evil might be avoided by a better ventilation in the manufactory. Ordinarily, in the work-rooms, no effort whatever is made to ventilate, and the fluff deposits in abundance on the floor, whence it is again distributed through the air on the merest movement. The spinners of hemp who work in the open air, are only subject to the special ailment caused by the Neapolitan hemp.

*Trimming Manufacture*, in which the fluff of silken fabrics is freely distributed through the workroom, leads to symptoms of a chronic bronchial kind, not unlike, but perhaps less in degree than, those caused by the hemp fluff. A woman from one of these manufactories came before us with profuse expectoration and cough. The expectoration was coloured as if with blood, and this circumstance had alarmed her considerably. On inquiry, we found that the colour imparted to the secretion was really not due to blood, but to some substance of fibrous texture and red tint. We should have thought that the patient was feign-

ing, but for the physical and unmistakeable evidence of severe bronchial disorder. The explanation of her occupation on the part of the patient, cleared up all the difficulty. The woman had been engaged in working red silk, and exposed to the silk fluff, which is given off in great quantities during the twisting process in the making of tassels. The sister of this same person worked at the same business, and suffered in the same way. We found, ultimately, that in the small unventilated room in which this woman spent her working hours with her sister, there were three more occupants, engaged in the same pursuit, and paying the same penalty. The business is one which few can bear for more than a few years, while some break down at once. Much depends on the size and ventilation of the workroom.

We cannot here omit noticing a remark made to us by a woman to whom our inquiries were being directed, in relation to the accommodations of women in workrooms and manufactories. We always "feel the room," said this person, "more than men, because we are put closer together." Why? we asked. "I do not know," was the reply, "but it seems to be an opinion amongst the masters that women can do with less room and put up with fewer accommodations than men." Like our witness, we cannot say why this is the fact; but on better acquaintance with the facts under consideration, we can confirm every word of her remark. Go into a work-room in which ten men would consider themselves half suffocated; change the occupants for women, instead of men, and sure as fate, where the ten men were arranged, fifteen women will be packed. Such perversity is unaccountable, idiotic we may say. But still the fact, still the fact.

*Fur-Dyeing* is another art, the evils of which to the artisan are many, and as serious as manifold. In the young and feeble workers, phthisis is the prevailing malady, in the more advanced chronic bronchitis in its most persistent form. These are the maladies. Let us but sketch out the nature of this occupation, and the mischief of it will not be far behind in the mind.

The object of the fur-dyeing process is threefold:—

1. To make bad furs look perfect.
2. To make the fur of one animal resemble that of another and different animal.
3. To change the colour of various furs.

The materials employed by the fur-dyer for the completion of one or other of these processes are—nitric acid, sal ammoniac, liquid ammonia, antimony, verdigris, litharge, alum, copper, copperas, lime, pearlash, soda, and gall-nuts. The nitric acid

is used as a cleansing substance, and also as a staining material to impart a yellow tint to some skins and to lighten the colour of skins which are black. The sal ammoniac, lime, litharge, and soda, mixed up together into solution with water, are employed to remove grease from skins that are going to be turned into a dark colour. The skins are brushed over with this solution.

The colouring fluids used are, first, as we have said, nitric acid. Secondly, a solution made as follows: Copperas, one pound; water twelve pints. This solution is used for producing a very black dye. Thirdly, a solution made thus: Gall-nuts roasted and ground into a powder, one pound; copperas, three ounces; sal ammoniac, two ounces; verdigris, two ounces and a half; litharge, one ounce and a half; copper-dust, two ounces; sumach, three ounces; these are all mixed together with water, so as to make in the whole three quarts of solution. This colouring solution gives either a light or a dark brown dye; light if much water is used, or if only one dressing is given; dark if the solution is concentrated, or if the fur is many times washed over with it.

When a fur is going to be coloured, it is washed over either with nitric acid or with the solution of sal ammoniac, lime, litharge, and soda, named above. The skin is then dried and the dust is beaten out of it; then the colouring solution, whichever it may be, is applied with a stiff brush, time after time, until the desired shade is obtained.

For the colouring of grenadier's bearskin caps, gall-nuts are boiled with the solution to be employed. The grenadier's cap is soaked in the solution.

A variety of other solutions have been tried in the fur-dyeing business, such as indigo, muriate of tin, and muriate of iron. They all fail. The muriate of iron colours the fur, but destroys the skin.

The injuries to health arising from this business occur at different stages of the process. In the first step, where the solution of nitric acid is being applied, a curious set of symptoms appear. As the nitrous acid fumes are inhaled, the mouth, tongue, and fauces are rendered dry and irritable, there is constant constipation, there is constant headache, and the pain in the head is invariably situated in the back part. Later, the skins, moist with the acid solution, are placed (it is the fact) in an air-tight heated chamber to *dry*. When the door of this chamber is opened, there is a perfect flood of acid vapour set free, in which the workmen are bathed. The effect of the inhalation is invariably to cause cough, dryness of the mouth and throat, constriction of the chest, and pain in the head.

When, instead of nitric acid, the second solution described above is used for the removal of greasy matter from the skins, ammoniacal fumes rise and excite a continued hacking cough, a languor and a headache which can hardly be borne ; a stranger to the work cannot tolerate it at all. The drying, after the application of this solution, is done as before, in a large air-tight chamber heated to 130° or more. The workmen have often to enter this room and remain in it several minutes for the purpose of removing dried skins and turning drying ones. The effort against absolute suffocation is tremendous during the performance of this duty.

It is but right to add that in some manufactories, as at Appold's, the principles of common sense in drying have prevailed, and that a ventilating shaft has been introduced into the heated chamber, through which the gases can escape. In smaller manufactories, no such provision is made.

A third and serious mischief is produced by the inhalation of the dust during the beating of the dried skins which have been previously soaked in the copperas solution. The dust thus discharged produces constant irritating cough, and the teeth are almost invariably affected by it ; these organs are slowly rendered brittle and generally carious. The grinding down of the colour stuffs from the crystalline to the pulverulent state leads to similar evil consequences. Thus in every part of this business the workmen inevitably suffer.

The remedies of a preventive kind in this occupation are obvious. The exposure to the nitrous acid fumes is removable by free ventilation. The dusting process could all be done by machinery similar to that used for common threshing purposes, and the grinding of the powder by mill-work. There is no class of occupation requiring more urgent reform than the fur-dyeing manufacture.

*Cigar and Snuff Making* are businesses accompanied by results little less injurious than those arising from the aforenamed pursuits. The manufacture of cigars consists in rolling up the leaves of the tobacco-plant into the cigar shape ; or, in inferior cigars, in rolling up the leaf over a quantity of broken up tobacco-leaf together with siftings, and even with the sweepings of the shop. The unanimous testimony of several workmen whom we have examined is to the effect, that, in the most common cigar, tobacco-leaf is always used. There is no other leaf, such as cabbage-leaf, used in the process.

At a further stage of the process, the cigar is placed in the drying-room. During drying the room is charged with vapour, which has much the same effect on the body as tobacco-smoke.

In making snuff, tobacco-leaf is finely cut up, well dried, and then pulverised together with an incongruous collection of foreign matter: lime, salt, flour, dust-sweepings, and, in yellow snuffs, lead; or, as one workman remarked, "anything else, as everything does for snuff that will powder fine." The mixture once made, it is placed in a bin, and heat is applied. Two or three times the mixture is removed from the bin to be turned. The heating process gives a sharpness to the snuff.

When the sharpening experiment is concluded, the mixture is sent to the mills to be ground and well dried. Then it is sifted; and lastly, the "liquor" is added to make the powder weigh heavier. The liquor is a solution of common salt and water. The hotch-potch is now finished, and is ready for the nose of the unfortunate consuming sufferer, whom may it continue to please.

The evils to the workmen abound. The rooms in which they work are close, unventilated, and filled with dust, which inhaled, gives rise to throat irritation, cough, and vomiting. Sifting the shorts is in this way more hurtful than rolling the dust cigar. The inhalation of the vapour from the cigar drying-room sets up in young hands all the symptoms of tobacco poisoning: dryness of throat, cough, headache, and vomiting are the prominent symptoms. In snuff-making, the turning of the mixture which is being heated in the bin sets up the poison symptoms even more effectually. The young workman at this department is seriously poisoned; he grows faint and sick, and suffers from violent head-symptoms. His consolation is that he shall get used to the poison if he only sticks to it; and, as far as acute symptoms are concerned, he is not, as a general rule, deceived. The sifting of the dried and ground snuff is followed by analogous effects.

But it is not to be presumed that the disease symptoms stop where we have left them above. The system of the workman becomes tolerant in some measure; but the tolerance is only partial. There are induced, by continued application, chronic maladies which do not so easily desert him, and which sometimes cost him his life. Pulmonary consumption is one of these diseases. In less serious cases, dyspepsia, anæmia, and rapid and irregular action of the heart present themselves as symptoms, and continue so long as the occupation is the means of obtaining that daily bread which is purchased to ply a poisoned body.

We must not omit to mention, that the occupation leads to excessive abuse in the habits of smoking and chewing tobacco. One man informed us that some workmen seemed as if they could not exist unless they were smoking or chewing.

From these combined evils few workmen, if any, escape; they are rarely able to follow their employment beyond the age of two score years.

In relation to the mischiefs due to the cigar and snuff manufactures, many philanthropists would doubtless offer a sweeping recipe. They would do away with the evil wholesale. We, taking a more practical view, and feeling that any attempt to suppress the business altogether is untenable, would simply suggest palliative measures. These would consist in securing a thorough ventilation of the work-rooms, a plan for turning over the drying snuff with the mouth and nostrils of the turners protected, and the sifting of the snuff by machinery worked in closed boxes or small chambers.

We have thus sketched out six illustrations of life sacrificed to labour. We must not in one number trespass with further instances. The reader who has followed us so far will have observed, that all the examples supplied of diseases arising from occupations, are examples in which the lungs are prominently and mainly affected. If we were to follow out the inquiry to its fullest extent, we believe that the same general rule would be found to prevail.

There are truly some disorders which are localised in other than the lung-structures, and which result from occupation. In this category we may name the local affection of the jaw arising from phosphorus; the curvature of spine incident to long confined position of body; the rheumatic affection of joint arising from labours conducted in underground caverns, and which expose the men to constant damp; and so on, through, it may be, twenty exceptional cases. But the grand rule obtains, we say, in the majority of occupations, that the lungs are the seat of the induced disease. When air is inhaled rendered simply impure by vitiation with the air expired by the subject, the symptoms are chronic in character and assume the phthisical type. When the air is surcharged with dust or fluff, the irritating agent applied directly to the minute ramifications of the air-tubes sets up bronchial mischief, and either at once destroys by a series of exhaustive symptoms resembling phthisis, or leads to chronic disease and a persistent bronchial flux.

In other classes of cases, where the foreign body inhaled is not only irritating to the lungs, but is capable of entering the body by absorption from the lungs into the blood, as in the manufacture of snuff and in the drying of cigars, general symptoms, specific to the poison inhaled, are the result.

When we look at diseases as a whole, we stand amazed at

the varieties of type which they assume. When we classify them into groups according to their causes, we stand equally amazed at finding to how very few groups all diseases may be reduced. We find all the disease-causes out of the body, and clothed in externals. Resolving the causes, there stand out some dozen poisons of communicable and reproductive power, as improper dietary, variations of atmosphere, and occupation. Of all these, the last stands most invitingly for inquiry. The inquiry is of a kind to which the most rigid rules are applicable. Its results might be demonstrations; its suggested remedies simple certainties. Surely greater inducements to the performance of a great national requirement never before presented themselves to the ministerial mind.

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## THE HEALTH OF ENGLAND IN 1856.*

THE Registrar-General's reports and returns always rank amongst the first literary sanitary papers published in this country. They are social as well as sanitary histories; and once on a time, before the penny-wise-and-pound-foolish principle entered into the hearts of Treasury Lords, these important state papers were at the command of every man who was anxious to know of the health and physical wealth of his fellow countrymen. A dogged determination, on the part of the Lords publishers, to carry on their little trade, has prevented many readers from the benefit of their ordinary useful readings. Medical men have felt the evils of the Treasury publishing scheme greatly. They, as a body, are not wealthy. They, as a body, contribute all the facts out of which the death-rate and health-rate of England are composed. This duty, costing both time and labour, was formerly rewarded by permission to read the result; more was never asked. That privilege cut off now peremptorily and without reason, many of those who read our pages apply to us to give them, as far as we are able, a condensed account of the last Registrar-General's annual doings. In the sequel, we endeavour to supply this demand.

Never has such a favourable report been presented as that for 1856. 657,453 children were born alive. This number is 22,410 in excess of the preceding year. Of these children,

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* The Registrar-General's Annual Report for the Year 1856. London: Published by the Lords Commissioners of the Treasury, and sold by all Parliamentary Booksellers.

335,541 were boys, and 321,912 were girls; so that to every 100 girls, 104 boys were born alive. This proportion varies in different counties: thus in Wilts, 109 boys were born, to 100 girls; in Bucks, only 98 boys were born, to 100 girls. The natural increase in the population by excess of births over deaths was 729 daily, or 266,947 in the year; and even this number is too small, for, as no one is bound under penalty to give the registrar notice of a birth, many children are never entered on the register.

The birth-rate for the year was 3·452 per cent.; it is the highest on the English records.

*Marriages.* The number of marriages was unusually great; a sure sign of the prosperity of the country. 318,674 persons entered the matrimonial state, thereby founding 159,337 new families. This number is 7,224 greater than that for the preceding year. Early marriages are becoming much more frequent. Ten years ago, 13 in 100 of the young women who married were under age; now the proportion is 18 in 100.

The marriage register shews the pleasing fact, that an improvement in the elementary education of the people at large is going on. 71 per cent. of the men who were married wrote their names, and 29 per cent. made marks. Of the women, 60 in 100 wrote, and 40 made marks. Hence 13 in every 20 of the persons marrying could write. The deficiency is greatest on the part of the females; yet they have made much greater progress during the last fifteen years than the men. In 1841, only 51 per cent. of the women, and 67 per cent. of the men, who married could write.

*Deaths.* "390,506 deaths were registered in the year, or less by 35,197 than the deaths in the previous year; and the rate of mortality was 2·050, or little more than 20 deaths in 1000. This is the lowest rate observed. The average rate of mortality for the last nineteen years was 2·236, or 22 in 1000. . . . In some counties the mortality was unusually low: thus, the mortality was 15 in 1000 in Westmoreland; less than 16 in Dorsetshire and Lincoln. . . . The mortality of London was less than 22 in 1000. The mortality was greatest in Lancashire (24·54) and Durham (25·54); where, with all their energy, many of the governing bodies have left the large towns deplorably destitute of satisfactory sanitary arrangements."

*Ages at which death occurs.* "The mortality varies at every age. It is lowest at some period between the age of 10 and 15 years. In the year 1856, the rate at that age (10-15) was ·45 per cent. in both sexes, or 4·5 deaths in the year to 1000 living. The vital force, or the power of resisting dissolution, increases rapidly from the date of birth up to the age of puberty; so that every year a child's chances

of living grow greater. After the age of puberty, when the body in every other respect is acquiring strength, the power of resisting disease declines slowly up to some age about fifty-five years, and then more rapidly. Thus, in the first five years of life, 68 in 1000 boys, and 59 in 1000 girls, die annually. In the second five years (5-10) of life, the proportion is 7 in 1000 in both sexes. In the ages commencing at fifteen, the deaths to 1000 males living in each of the successive periods of ten years, up to the age of fifty-five years, were nearly 7, 9, 12, 17; at fifty-five and upwards, 30, 61, 129, 263, and 322. The female mortality follows the same law; but it was lower at all ages, except 5-10, 15-35, 95 and upwards, than the mortality of males. At all ages, and in both sexes, the mortality was below the average in 1856."

Difference in temperature appears to have been a great cause of the difference in the mortality of England. In 1855, the average temperature of the first quarter was 34·1° Fahr.; of the corresponding quarter of 1856, the average temperature was 40° Fahr. The deaths in these two quarters were respectively 134,542, and 103,014; thereby shewing an excess of 31,528 deaths to be due to the severely cold winter of 1855.

Density of population also affects the death-rate of a district. Nearly one-half (over eight millions) of the population of England is lodged in large towns; and, while 25 in 1000 die in the town districts, the proportion is only 19 in 1000 in the country generally. The insalubrity of the dense districts arises not wholly from the fact of there being a large number of people congregated together, but in a great degree from the want of adequate means to redistribute over the earth the organic matter reduced to refuse in these large towns. Sanitary measures have greatly improved the health of thickly populated districts; but reform in sanitary matters, as well as in other cases, makes slow progress. Still density of population has much to do with the rate of mortality.

"In three districts of England, the annual mortality during ten years was at the rate of 15 deaths in every 1000 living; in fourteen districts, at the rate of 16; in forty-seven districts, at the rate of 17 in 1000 living. Where the mortality was 15, 16, and 17, the average number of persons living on a hundred acres was respectively 9, 17, and 22. Again, the annual mortality in the same period, in thirteen districts, was at the rate of 27 deaths to 1000 living; while in eighteen districts, the rates ranged from 28 to 36 deaths to 1000 living. The numbers of persons on a hundred acres in these districts were respectively 279 and 693."

There is a very marked difference in the mortalities of town and country districts in the summer quarter: in the former, 27 persons died to 1000 living; in the latter, the proportion

was only 18 in 1000. This speaks well for the country; but even here there is room for immense improvement in sanitary matters. The germs of insalubrity are scattered about in every village; for the rational laws of health are violated alike in the cottage and in the farm-house. Dwelling houses are frequently built on the most unhealthy sites; while the farmer surrounds his house with ricks, buildings, and trees, and, what is worse, the refuse of the house and of all the animals is kept month after month undergoing fermentation, and giving off noxious vapours. Can we wonder, then, that the cattle perish (unaccountably to the farmer), and that disease and death visit such abodes as these? In many minds, the English farmer is the personification of sound robust health; but the Registrar-General's figures say, 6,426 farmers die in a year; about three-fifths of them are under sixty-five years of age, and many of them are young men.

If then the country, for which nature does so much, demand improvements, how much more necessary is it that all our sanitary resources should be called forth to counteract the evil effects arising from the condensation of eight millions and a half of people in our large towns. "We want pure air and pure water about our dwellings, and the refuse, which infects the air and makes poison to man, to be restored directly to the soil." Attention to these matters, would render the population of our great country healthier and happier than it has ever been; and scarlatina, diarrhœa, typhus, whooping-cough, and small-pox, which have made many a home desolate in this otherwise healthy year, would be far less frequent. England is already the healthiest country of Europe; what position will it take when popular prejudice succumbs to sound reason, and when parish boards shall throw aside their party quarrels in consideration of the public weal.

390,506 persons died in England and Wales in 1856. Of these, about 324,000 died from diseases and accidents, which were, perhaps, inevitable; but 67,000 persons died from causes which, if skilfully attacked, may be either mitigated, or removed altogether. Many of the 67,000 had lived to the ordinary limits of human life, but thousands in the throng had not lived out half their days. This is bad; but 48,000 persons are now living who would have been dead, had the same rate of mortality prevailed in 1856 as in the ten preceding years; and the loss of life from the causes just mentioned, is 35,197 less than it was in the previous year. Many of these lives have been saved by sanitary improvements.

Appended to the Report of the Registrar General is a letter

from Dr. Farr on the causes of death, as far as they have been ascertained.

Of the 390·506 deaths in the year, the causes were not specified at all in 4,666 cases, and 3,474 are simply tabulated as sudden deaths, all inquiries having failed to elicit further definite information: 94,407 of the whole number of deaths were those of infants under one year old.

The causes of death are arranged in a few classes with numerous sub-divisions. 78,047 of the deaths are classified as zymotic diseases: typhus (15,398), scarlatina (14,160), and diarrhœa (13,815), proving fatal in 43,373 instances, or considerably more than one-half of the whole number due to this class. Hooping-cough, measles, and croup stand next in order. Small-pox, formerly so fatal, was the cause of death in 2,277 cases.

Of the class of diseases denominated "constitutional," 82,856 persons died. Phthisis or consumption stands sadly preeminent in this list, its victims numbering 48,950 persons, by far the greater proportion of whom were young women. "How many of the thousands of deaths are to be ascribed severally to the fatal stays and to the in-door life of women, etc. it is not easy to calculate. Air is the pabulum of life, and the effects of a tight cord round the neck, and of tight lacing round the waist, differ only in degree in the time of their manifestation and in some of their symptoms; for the strangulations are both fatal. To wear tight laced stays is, in many cases, to wither, to waste, and to die, and is perhaps the natural chastisement of the folly which inflicts this Chinese deformity, natural only to wasps and other insects, on the human figure." The tubercular diseases carried off in all 63,832 persons.

The "local diseases," as inflammations, the allied pathological phenomena or their results, and functional diseases of particular organs, proved fatal to 149,911 persons. 50,535 of these died of diseases of the brain and nervous system, including also 23,946 deaths by convulsions. 13,672 deaths were referred to diseases of the organs of circulation. Diseases of the respiratory organs proved fatal to 52,908 persons, 21,528 of whom died from bronchitis and 22,653 by pneumonia. These diseases, and all others of the class, were less fatal than in the previous year. 22,620 persons died from diseases of the digestive organs. The other causes of death under this heading are numerous, but the cases are few in each.

It is gratifying to observe the decrease of mortality in childbirth. The birth of 10,000 living children involved the deaths of sixty mothers in 1847, but the proportion of deaths has

gradually decreased each year, until in 1856 it was reduced to forty-four. The lives of sixteen mothers were thus saved in every 10,000 children born.

The cases classified as premature birth and debility amounts to 17,997. Atrophy or wasting away was returned as the cause of death in 13,712 cases. 23,931 persons died of old age. 14,912 deaths arose from external causes, and therefore belong to the violent order of unnatural deaths. 237 deaths are referred to intemperance, 451 to delirium tremens. The mortality under both these heads has decreased during the last three years. Burns and scalds caused the deaths of 2,919 persons. 432 persons were poisoned, this number being 52 in excess of the previous year. 1,314 persons died from hanging and strangulation, and 2,681 from drowning. Carelessness in the management of mechanical forces is manifested in the deaths of 5,433 persons from fractures and contusions. Happily the deaths from these causes are gradually decreasing.

Few diseases are equally fatal to both sexes. Hooping-cough, influenza, dropsy, heart-disease, and consumption are more fatal to females than to males ; but small-pox, diseases of the respiratory organs, and indeed almost all other diseases, are more fatal in their effects upon men than upon women.

It is remarkable that so many as 21,801 persons should have died in such a manner as to require a coroner's inquest. The verdicts were—murder 205, manslaughter 271, justifiable homicide 6, suicide 1,314, accidental deaths 9,716, natural deaths 7,102, *found dead* 3,183. Persons have questioned the wisdom of holding so many inquests, seeing that so few persons were ultimately convicted. It must, however, be remembered that 1,314 suicides are included in the lists, and after all the information that could be elicited, the verdict was, in 3,183 instances, *found dead.* No one surely will deny the importance of inquiry into such cases as these ; nor must we measure the value of a coroner's inquest simply by crime found out. How many assassinations are prevented by fear of the after inquiry ?

A few meteorological facts will conclude our review of this report for 1856. Greenwich is the point of observation.

The air in 1856 moved faster upon the average than it had done for the three preceding years. Its hourly rate was 4·244 miles, or nearly $4\frac{1}{4}$ miles, thereby giving an excess of velocity of about three miles per day. The rain fall was 21·9 inches, which is slightly below the average of the last eight years. The mean annual temperature was 49·1° Fahr., an average degree.

# THE EPITOME OF SANITARY LITERATURE.

Resources of India.

Dr. Forbes Watson is preparing an elaborate work on the value, as food, of the various grains which are produced in our Eastern possessions. He has reprinted the introductory chapter under the title of *Remarks on the Development of the Resources of India.* His object is to direct attention to the study of the natural resources of that country, as a means of increasing the material comfort, and consequently the happiness, of the natives. For such a study, the museum opened at the India House, under the management of the late Dr. Forbes Royle, and now entrusted to Dr. Watson, promises to afford abundant material; but that the utility of such an institution may be greatest, it must, as Dr. Watson observes, be truly industrial. It must, whenever possible, contain specimens both of the manufactures, or of the elaborated substances, along with the raw products which have yielded them,—whether these respectively belong to the mineral or the vegetable kingdoms. From such a collection, properly worked by competent men, much may be learned; and already the India House museum is being turned to practical use by Dr. Watson in his researches on the food-grains and pulses. An extract from his pamphlet will shew the great value of the investigations in which he has been engaged.

"We have already in this country excellent collections of the food-grains of the East; but, as they at present stand, they impart no precise notion of their *real* value; and, in the great majority of instances, simply represent a number of small nodular masses, of different shapes and colours, in so many glass jars, and nothing more. This, however, need no longer be the case. Every such sample in future presented to the public, may be employed as an instrument of instruction: it may indicate not only the place of growth and average price in the Indian market, but also its value as an article of food for man or beast. And in addition to furnishing the means of comparison with substances the value of which is well known, these researches farther fulfil the important function of definitely settling what articles are really nutritive, as well as those which are not so.

"The Indian *cereals*, of which forty samples have been submitted to repeated examination, are ten in number. Of rice and wheat little need be said here. . . . . Amongst the remaining eight grains, at least two, from their nutritive and other qualities, are well worthy of attention. These are, the 'great millet,' or Indian *jowaree*, and the 'spiked millet', or *bajra*. A variety of the former is being now introduced into the south of France: its culture has been also extended in Algiers, the climate of which seems admirably adapted to its growth. This kind affords very large returns,

excellent sugar, and other products besides. The *bajra* is also a very prolific and valuable grain: it is a great favourite with the natives. The two together form the staple food of a larger population in India than even rice itself, which is considerably inferior to both, as well in nutritive power as in price. They are, in fact, to a vast population, what oatmeal is to Scotland, and maize-flour to America.

"With regard to the numerous *pulses* of India, a few remarks will suffice. They occupy a most important position in the food resources of the country: they are, in fact, to the Brahmin and to the poor, what beef and other flesh are to us; they supply to the muscles that power which neither rice nor other chiefly amylaceous grains are capable of affording. The popular notion that rice forms the entire bulk of the diet of the inhabitants of the East is most fallacious. The stomach of the poor ryot—large as it is—could not with impunity take in and digest the quantity of rice which would be sufficient, day by day, to supply the wants of his system. The pulses, on the other hand, are, as a rule, too rich in exactly that constituent which is deficient in rice. If we attempt to feed men or animals on either one or the other of these *alone*, for even a short period (with, perhaps, one exception, to be presently mentioned), disease and starvation result. Nature's promptings have, however, led the inhabitants of the East to mix these grains together in the quantities necessary to supply the constitutional or innate requirements of his body.....

"In calculating the importance of pulses as articles of food for either man or beast, there are two points from which they must be viewed. As already mentioned, perhaps the whole tribe are incapable of being employed for any length of time, with advantage, *alone*. They are, in one respect, too rich, and must be brought down to a proper standard. The legume, accordingly, which contains *least* of the usually over-abundant flesh-forming substance will, by itself, prove the most nutritious; whereas, on the other hand, the one that contains *most* of the same ingredient will go farthest in yielding to rice or other over-starchy grains the muscle-power in which they are defective. Considered, then, with reference to their nutritive powers, our investigations bring two pulses prominently into relief, as likely to prove of great importance, especially to the agriculturist in this country; and, with regard to one of these, our conclusions are most fully borne out by experience in India and elsewhere. *Gram*, the great horse-food of Western and Northern India, when husked and parched, forms on the voyage, and often on the march, almost the entire food of the Sepoy. In it the essential elements are so fairly balanced, that it can be taken for a longer period than any other of the pea or bean tribe with which we are acquainted; and long employment of it in India has shown that, not only for imparting the requisite strength to animals at work, but also for feeding purposes, it is unrivalled. Throughout the greater part of India it is employed for our horses;

and the gram-fed mutton of Bengal has long been famous. Impressed with the importance of its introduction, not only by export from India, but also by actual growth in this country, we have this season succeeded in having the experiment tried on a sufficiently large scale, in different parts of England as well as in Scotland. Failure has occurred in a few instances; but the general result is most favourable. We have already received samples from our friends in the country, the appearance and nutritive qualities of which are found, on examination, to be quite equal to that of the seed originally furnished. Specimens also of the plant have been sent, covered with pods; and we have reason to conclude that the yield is not likely to fall short of, at least, that usually obtained in India.

"In determining the nutritive value of the pulse tribe, we have considered, in the first place, their wholesomeness when eaten *per se;* and in the second, their power of yielding flesh-forming matter to grains poor in that constituent. Hence it is that gram can be employed without injury, for a longer time alone, than any other legume yet known; while others require for their dilution, so to speak, certain admixtures of various kinds. Ignorance, or neglect of this custom, which has been practised in India for ages, has, in Europe, been productive of the most serious consequences. As a proof of this fact, one illustration will suffice. The chickling vetch (*Lathyrus sativus*) contains a larger quantity of nitrogenous or flesh-forming matter than any other of these pulses,—with but one exception, to be presently mentioned. This vetch is still cultivated on the continent; but during the last century it formed, in several parts, a chief aliment of the people, and produced such deleterious effects that the use of it was prohibited by the governments of the countries in which it was raised. When mixed with wheaten flour, or otherwise reduced, it was found to be wholesome; but when employed for some time alone, rigidity of the muscles and paralysis of the limbs resulted. The same effects were also produced on horses and other animals; and Fabbroni, writing from Florence in 1786, states that the government had cautioned the peasants against it as an article of diet, swine having lost the use of their legs from having been exclusively fed on it. Experience, therefore, not only in India, but also in Europe, bears out the conclusion to which, on scientific grounds, we have come.

"The pulse to which we would now call special attention is one calculated to play a most important part as a nutritive substance. *Bhoot* is the native name for it in some parts of India: botanically it is known as *Soja hispida*. It grows not only in India, but also in some of the islands of the Eastern Archipelago, from whence it forms an important article of export to China. Numerous samples of it have been submitted to analysis. It contains not only large proportions of those mineral constituents which are essential to the formation of the frame, but stands unrivalled in its capacity of supplying flesh-forming material to substances deficient in that respect.

"So far chiefly with reference to this country; but, turning to India, the information now afforded of the real nutritive value of the various grains which constitute the staple food of its inhabitants, can be shown to be of still greater importance. As already indicated, experience has taught the native to combine with the grains with which nature has so liberally provided him, certain admixtures which contain the proportions requisite to sustain his bodily strength. A few of these, in every district, are thus employed as articles of diet; but in order to facilitate the practice, and to extend the power of employing *all* the various grain-food products in the same manner, Table No. V. further indicates the proportions in which over-rich pulse grains must be mixed with others in order to produce a wholesome food. Each compound thus artificially formed will contain the essential constituents in the same proportions as in wheat, which we have taken as our standard of comparison; and when dressed in the usual way, with a certain proportion of *ghee*, or fatty matter, will prove equally nutritious. Thus the commissariat officer will be enabled, in accordance with whatever products may for the time be procurable, more readily to furnish a diet calculated to support health and strength; and, in the same manner, in seasons of famine, or during partial failures of the pulse or other crops usually depended on, to point out to those in power the mode of forming various wholesome compounds from other, and for the time, more attainable substances.

"The relative value of the various grains employed in different districts has a very important bearing on a general question affecting the duty of every government. Wherever it is found, whether in Ireland or in India, that the chief article used by the people as food is deficient in nutritive power, every effort should be made to introduce in its stead not one unobjectionable substance, but as many such as practicable. And this remark applies with considerable force to a large tract of country in India, in which the millet now chiefly employed, is, by itself, very innutritious. We allude to a small grain called *raggy* (*Eleusine corocana*), which forms the principal article of diet along the Western Ghauts even in ordinary seasons, and also in many parts of the Deccan. It is very hardy, and extremely prolific; but its very low nutritive power can be readily judged from the large quantity of the various pulses which must be added to it in order to bring it up to the standard. In some parts of the country it is only had recourse to in seasons of scarcity, when it plays the part of a famine food,—and this is its legitimate use; but in those districts, especially, where it is now the grain chiefly depended on, the people should be encouraged, and, if need be, assisted to introduce some of the other millets, the superiority of which can be seen at a glance."

Health of the Navy.

Dr. Alexander Armstrong, surgeon to Her Majesty's ship *Investigator* during the recent polar expedition, has published a valuable work entitled *Observations on Naval Hygiene and Scurvy, more particularly as the latter appeared during a Polar Voyage.* In all previous arctic expe-

ditions, scurvy had appeared during the first year; but, in the present instance, two years and three-quarters elapsed before the disease appeared on board the *Investigator*, notwithstanding a sea-voyage of six months duration, and a sojourn of two months on the ice,—during the first of which the crew had an insufficient supply of food, and in the second of which the allowance was reduced to two-thirds of the original quantity. Their long exemption from disease was the result of proper attention to certain hygienic measures, which ought always to be followed on board ship. These are:—care in the selection of a healthy crew, especial attention being paid, among other things, to the state of the chest, and of the hepatic and splenic regions; maintaining a pure and dry air between decks, and keeping the decks always dry; pumping the bilges daily, and washing them with salt water; sufficient clothing for the men, flannel being worn next the skin; removal of wet clothes; sea-bathing once daily; the promotion of cheerfulness,—for which a musical band would be very useful; and a proper supply both of animal and of vegetable food, and of that well-proved preventive of scurvy, lemon-juice. Regarding lemon-juice, Dr. Armstrong says that, though it may be issued regularly to the men, it does not follow that it is properly consumed:

"This I know from experience, not alone from observing the practice adopted in polar ships, but likewise from my observations made in the general service of the navy. When the lime-juice is taken into the different messes, many of the men are careless about it, and seldom or never take it; others will give it away, or, what is a common occurrence, will barter it with the few who are wise enough to prefer it to spirits,—so that one half of the crew may not in all probability take it. Thus there is no certainty whatever that it is taken by all with any degree of regularity; but there is positive evidence to the contrary. In order that each man should drink his proper allowance, I proposed for adoption the plan I have already mentioned,—which was very strictly carried out. I could wish that this plan was enforced in the navy, not only as regards lime juice, but likewise spirits; for I am quite satisfied that by making the men drink their allowance of either at the tub where it is mixed in presence of the officer who always superintends the 'grog tub', the most beneficial results would accrue, not only in a sanitary point of view, but in preventing the occurrence of drunkenness and its attendant evils on board ships of war."

Egypt as a Residence for Invalids.

Dr. Dickinson, of Liverpool, being last year under the necessity of seeking to restore impaired health, visited Egypt and Nubia. On returning, he has given the results of his observations on the salubrity of these countries, in a pamphlet entitled *Egypt and Nubia; their Climate, Character, and Merits as a Winter Residence for*

*Invalids.* In ancient times, Egypt was well populated with a healthy race; and epidemic disease, if historians are to be trusted, was rare. Now, however, the reverse obtains, mainly from preventable causes. The ancient salubrity of Egypt is said to have ceased when embalming was discontinued, about the middle of the fourth century; and in Lower Egypt, the emanations from the dead, in the parts from which the overflowing of the Nile has subsided, are possibly a source of disease.

"But far more may be attributed to the great moral and physical degradation of the people, to their insufficient and unwholesome food; to their low, ill-ventilated, over-crowded, wretched huts; and the agency of animal and vegetable matters putrefying in an alluvial or marshy soil like that of the Delta."

Sanitary reform is sadly wanted in Egypt,—the more so as in itself the country possesses some of the most important elements of salubrity. Dr. Dickinson regained in it his lost health; and he encourages other invalids to follow his example. The plan to be followed is to make a well-arranged voyage up the Nile, from Cairo (lat. 30° N.) to the second cataract in Nubia (lat. 22° N.). Alexandria is not a desirable place in which to remain; the traveller should proceed at once to Cairo.

"As the northerly winds set in about November, and the climate of Cairo is then not too hot for the European invalid, he may safely arrange to arrive there at the beginning or middle of this month. The ascent of the river should be commenced before its expiration, so that Thebes may be reached in December. Here he may remain some little time, arriving in Nubia in the beginning of January, before which time the climate is too hot; and leaving it again about the middle of February for the same reason. Resting again for a short time at Thebes, the invalid should arrange to reach Cairo before the middle of March, at which time the heat on the Nile is too great to render a boat residence at all agreeable. Here he may remain until the end of the month, when the climate of Cairo itself begins to be too hot for a European invalid."

Infant Hygiene.

A Society which has been organised under the title of the "Ladies' National Association for the Diffusion of Sanitary Knowledge," is issuing tracts on matters relating to health, written in a simple style, and published at a cheap rate, so as to be easily procured and understood by all classes. Among them we meet with four relating specially to the management of infants; bearing the titles, respectively, of —*How to Manage a Baby; How to Feed a Baby with the Bottle; The Evils of Wet Nursing—a Warning to Mothers;* and, *The Evils of Perambulators—a Word to Mothers.* The precepts laid down in these are in close accordance with the dictates of nature; and, if they are followed, it may be con-

fidently expected that much both of the disease and of the mortality among children, which now is a disgrace to our civilisation, will be prevented. From the tract, *How to Manage a Baby,* we take as a specimen the remarks on Walking.

"People talk about 'teaching babies to walk;' but babies do not need teaching, for they will be sure to get up and walk, when their legs are strong enough, and it does them harm to do so before; in this, as in very many other things, babies would be all the better for being left to themselves. But this does not suit some mothers who are in a hurry to see their children walk; such mothers cannot rest content without putting their children into leading strings, or go-carts, or leading them with the hand. All that they generally get for their pains is the sight of their children's bandy legs and crooked ankles, caused by being forced to walk before their time. Who would be a baby?

"But, though baby should not be hurried in walking, it should be allowed to keep moving all day long, while it is awake, for the limbs cannot get strong unless they are used. The best plan is, to put a piece of soft matting and a piece of carpet on the floor, and put baby down upon them to stretch, roll, and tumble about like all other young creatures. If it has a ball or a rag doll to crawl about after, it will be 'as happy as the days are long,' and will, besides, be very little trouble, and be making its limbs strong, ready to walk by-and-bye. It is a great pity to accustom a baby to be nursed, for it only does it harm, and gives the mother a world of trouble into the bargain. . . . In the summer, it is a good plan to spread the matting and carpet on the grass in the garden, and put baby down on them, to use its limbs in the pure air and light. In short, wherever it is, and whatever it does, it should keep moving all the time. The birds, the beasts, the fish, and the creeping things are scarcely ever still five minutes together in the day time. Moving brings life and health to all things, babies among the rest."

The tract from which we have made this extract, contains also, advice arranged under the heads of Washing, Dress, Food, Cutting the Teeth, Sleep, Going Out-doors, Talking, Vaccination and Physic. Under the latter head, mothers are sensibly advised "to learn to keep themselves and their children well, and leave the curing illness to those who understand it."

Swimming for Women.

*Why do not Women Swim? A Voice from many Waters,* is the title of one of the tracts issued by the same association.

"When shall we," says the author, "leave off our wild goose chase after health in the consulting rooms of charlatans, and know that she lies hidden in the bright wave and shady glen, and sits wooing us among the flowers on the meadow-side? In vain, for most of us, the fresh mountain breeze blows; in vain the fields are green and beautiful; in vain volumes of health-giving water

circle our island home; we value them them little, because of their very freeness."

The instruction of women in swimming is advocated, on the ground that the ability to perform this exercise would be the means both of saving life in shipwreck and other accidents on the water, and of developing the full hygienic value of our seas and rivers. To the objections that "swimming is utterly inconsistent with womanly decorum," and that it "has a tendency to make the female sex masculine," answers are given. We do not like "strong-minded" women of the *ultra* stamp; but surely there is room for an advance beyond the close conventional limits of modern civilisation. Woman would not be less woman if she could swim.

Women's Clothing.

In an article on *Cheap Clothing*, reprinted from the *English-woman's Review*, the evils resulting from the use of insufficient clothing are pointed out. Cheap material is, in the opinion of the writer, one of the banes of our female population; inducing consumption and degeneration of race. It is believed, probably with correctness, that England is the only country in Europe, where the dress of the lower class is not appropriate to the climate.

"The peasantry in Normandy and Brittany, though their climate is far better than ours, and the winter much shorter, clothe themselves in substantial woollen garments as cold weather approaches; indeed, they carry a weight of clothing at all seasons which to us appears extraordinary. The costume of the women in these provinces, who come to the markets with country produce, is usually the following:—A close fitting suit with long sleeves, of dark blue cloth, a very full plaited petticoat of dark woollen plaid, a scarlet or yellow shawl of small size, crossed in front, and tightly pinned down, an apron of showy pattern, with large pockets, of some cotton fabric, and passing out from the short upper garment may be seen a red woollen petticoat and thick grey worsted stockings; in addition to this they wear a camisole, or under-vest, close to the throat, with long sleeves of their own knitting; and with the crowning article, the coiffe, which, in Normandy is made up of muslin, lace, and pasteboard, the female peasant looks more picturesque than ours do with their attempts at the fashion of their betters."

Topography of Aspley Guise.

A Notice of Dr. James Williams's work on the *Topography and Climate of Aspley Guise in reference to their Influence upon Health and Disease*, as it appeared in its first edition, has already appeared in the pages of the SANITARY REVIEW. In this second and enlarged edition, Dr. Williams gives a more detailed account of the locality concerning which he writes, including some most interesting details,

geographical, geological, and botanical. The facts relating to climate are also described with great care; and comparisons are drawn between the climate of this spot and the climates of Nice, Pau, Madeira, the Isle of Wight, Hastings, and the Channel Islands. In a word, we are of opinion that Dr. Williams's descriptions of an English resting place for the English man or woman whose physical impairments demand rest, pure air, and the renovating agency of nature seen in her most enticing vestments, cannot be made too well or widely known. In the last part of his work, Dr. Williams gives an outline of the hygienic treatment of pulmonary consumption, in which he supports, at considerable length, the views which have been often advocated in this Review.

Factory Life.

It has rarely been our lot to read a series of more interesting letters than those in a pamphlet entitled *Experience of Factory Life:* by M. M.; reprinted from *The Waverley*, a Working Woman's Journal. The factory referred to is situated in a south eastern county; the factory work was performed, at the time the author of the pamphlet first visited the factory, by 937 women and girls, and about 76 men. The writer, hearing that the benevolent proprietors of the factory were looking out for some lady who would read and lecture to the girls, undertook herself this labour, and the little unassuming work chronicles her useful labours.

On first visiting her new residence, the writer found in the houses of the employed three great social sores all more or less connected with ignorance—viz., "careless and too early marriages; unsteady, idle conduct in the young women; and total disregard of all sanitary laws." To remedy these evils, there were established schools, an institute, a factory kitchen, a home, a nursery, an amusement society and a sick fund. The results of these institutions, in the course of a few short years, are such as to encourage every philanthropic heart, and we suggest without comment the perusal of these results by all our earnest fellow workers.

Amongst other works received by us this quarter we may notice Dr. Conway Evans's *Report on the Sanitary Condition of the Strand District;* a paper on *Marine Sanatoria*, by Dr. Morley Rooke, in which the author, while sustaining a controversy of a local kind, lays down some very sound rules as to the construction of these residences; a *Report of the Hygienic Congress at Copenhagen* in July 1858, an interesting and valuable document; and several numbers of a Danish sanitary periodical, containing a series of valuable papers, and edited by Dr. Hornemann, of Copenhagen.

# ORIGINAL COMMUNICATIONS.

## SUGGESTIONS TOWARDS A MORE PERFECT SYSTEM OF SELF-ACTING VENTILATION.

By J. N. RADCLIFFE, M.R.C.S., late of the Staff of H.H. Omar Pacha.

THE circumstances which gave rise to the suggestions which form the subject of this paper, arose mainly during the Crimean war. At that time, the question was often forced upon military medical men, how best to ventilate crowded huts, so that a sufficient amount of fresh air might be introduced into them, and the discomforts of currents avoided. The huts first sent out to the troops were ventilated chiefly by a window placed at each extremity of the hut, about six feet above the ground, and by the door. Subsequently huts of a better construction were erected, in which the windows were more numerous, and outlets for foul air were provided at the summit, and inlets for fresh air near the ground, generally beneath the platforms upon which the men reposed. Frequently, however, the outlets in the roof were too small to serve sufficiently the purposes for which they were intended ; frequently, also, both outlets and inlets were tampered with by the men, and stopped with rags.

When, as in the hospital huts, the foul air outlets were of sufficient magnitude and care was taken that the inlets were not interfered with, the ventilation was, upon the whole, satisfactory. But still, during the winter months, difficulties often occurred from, and injurious effects not unfrequently were produced by the occlusion of both inlets and outlets of air by the men, on the plea of discomfort from cold draughts. The Army Sanitary Commissioners in their report state this plea in the general form "cold weather," and consider that it was not a valid one. My experience led me to the conclusion that the plea, as I have expressed it, and have usually heard it expressed by the men, was valid, and that it was one of the most obnoxious discomforts in cold windy weather of the less sheltered, and particularly the more flimsily built huts. But be that as it may, it is certain that the men often stopped up the ventilating openings in the huts, and that, not unfrequently, evils arose from this source; and it was evident that, if a system of ventilation could be invented, by which a sufficiency of fresh air could be introduced into the huts, without occasioning the discomforts arising from draughts, and which, also, should be little likely to be tampered with, a great advantage would be obtained, both for the comfort and well-being of the soldiers.

Moreover, the solution of the question would most probably solve a problem of wider application than the ventilation of camp huts.

The Turkish soldier is much more addicted to close all means of egress or ingress of air into the hut, or tent, or building that he may be quartered in during cold weather, than the British soldier. Few greater sanitary evils can be found during a winter campaign in the Turkish army, than the dense crowding together of the Turkish soldiers in their quarters, and their persevering efforts to shut out fresh air.

Consequently, the evils arising from a want of a system of ventilation in huts, or quarters, which could not well be tampered with by the men, were more conspicuous in the Turkish than in the British army.

The only opportunity which I had during the war of attempting to overcome the difficulty of obtaining a free, and yet not troublesome ventilation under circumstances similar to those stated, occurred, not in camp, but in quarters at Sinope.

A serious outbreak of fever had appeared on board a Turkish line-of-battle-ship in the harbour, and the sick had been removed into a temporary hospital on shore. The outbreak had been occasioned by the whole of the crew, upwards of five hundred men, being allowed to huddle together in the lower deck, for several nights during a short period of severe weather; one only of the hatches being open. The fever had been aggravated on shore by the sick being crowded as closely as they could be packed, into several small rooms; every inlet by which fresh air could obtain admission, and every outlet by which foul air could obtain egress, being closed. The sick, soon after being removed on shore, were consigned to the care of the medical staff, of which I was a member. Many of the men had been placed in rubble-built and tile-roofed sheds; and these men, to all intents and purposes, were circumstanced, as far as ventilation was concerned, similarly to the men quartered in huts in the field. In one of the sheds which was situated beneath the lofty wall of the inner quadrangle of the citadel, thirteen patients had to be accommodated, and their beds nearly filled the floor. The shed was lit by two small windows, the sashes of which were fixed, and the only opening either for the ingress or egress of air was the door. A wood ceiling was interposed between the tiled and sloping roof of the shed and the floor, at a height of about ten feet from the

* A report of this outbreak may be found in the Transactions of the Epidemiological Society for 1858, p. 13.

latter. Under these circumstances, and knowing the habits of the men, it was certain that any attempt to obtain a sufficient supply of fresh air from the door, or the windows, or the walls of the building would be useless; as, the moment the back of the medical man was turned, the nights and days being somewhat chilly, the openings would be closed. It had occurred to me several times in the Crimea, that the only system of ventilation which was adapted to circumstances of this kind, was the self-acting roof, or so-called siphon ventilator. If a tube or shaft, having a longitudinal diaphragm, communicate with a chamber containing air of a temperature higher than that of the air external to it, a double current will be established; a current of warm air flowing out of the chamber through one division of the tube, a current of cold air flowing into the chamber through the other division. I had had several opportunities of witnessing the success of this principle of ventilation in several large public rooms in England; and I determined, with the consent of the inspector of our staff, to give it a trial here. I forthwith caused capacious openings to be made in the ceiling and roof, and above this opening in the roof, a shaft was erected, several feet in height. The shaft was divided by a longitudinal partition within, and above it was erected a roof large enough to prevent the intrusion of wind or rain. The doors and windows were left untouched, and the ventilation was allowed to depend upon the roof shaft alone. Nothing could be more satisfactory than the result, for although, subsequently, it became necessary to place two or three beds more in the shed, and literally to cram it, the ventilation was most effective, and the patients did not complain of the slightest discomfort. In another shed the result was equally satisfactory; in a third, the ventilation failed in part, from the insufficient size of the openings.

Here then, in this system of ventilation, seemed to be a solution of the question respecting the comfortable and secure ventilation of crowded huts; and not of huts or sheds only, for several times in England, I had witnessed difficulties with regard to the ventilation of hospital wards and other rooms, similar to those encountered in the Crimean huts, and in the sheds at Sinope; but the necessity had never before been forced so fully upon me of overcoming them.

I remembered, however, that objections to the adoption of the siphon system of ventilation, except in lofty rooms, had been urged, from the upper stratum of air being kept at an uncomfortably diminished temperature, and from the prevalence of downward draughts in the rooms. Neither of these

discomforts, so far as I could ascertain, occurred in the sheds at Sinope; and, considering the largeness of the ventilating shafts, and the lowness of the sheds, I was puzzled at first to account for this. At last, however, and after having again had my attention called to the practical use of this system of ventilation, it occurred to me that the ceiling in the sheds at Sinope played a more important part in obviating the objections alluded to than I had at first supposed. The interval between the ceiling and the tiles in the sheds constituted a large air-chamber, and the ceiling acted as a diaphragm between the air-chamber and the room. Was it not possible that the ceiling might have had the effect of diminishing the force with which the current of air from the shaft entered the shed, and also have prevented a too rapid reduction of temperature in the upper stratum of air? I am very much inclined to believe now, that this was the case, and that, by working out this conception, the application of the roof system of self-acting ventilation may be more widely extended.

In the instances in which I have seen the siphon system of ventilation carried most fully out, the shafts have been made to communicate directly with the room ventilated. In large and lofty public rooms, this perhaps might be an advantage, save and except that the amount of ventilation is usually made to depend upon the ornamental design of the architect, rather than upon the necessities of the building, several small perforated spaces in the ceiling being alone yielded for the work of ventilation. Again, the ventilators themselves have not been easy of architectural management, and most frequently they have disfigured the roof of the building externally. Now, I believe that my notions of a diaphragm might aid a little in bringing about that blessed epoch in architectural art, when architect and ventilating engineers might work with one heart and soul; and this, be it understood, in addition to removing the objections I have heard attached to the siphon system. Above all, I believe it would enable the system to be carried out to that liberal extent which is necessary to secure its efficiency without annoying either inmate or architect. For one of the greatest evils in all systems of ventilation is a niggardliness in providing both inlets and outlets of air.

Suppose that it were required to ventilate the wards of a two or three storied hospital, constructed in detached wings, the ventilation of each ward to be complete in itself; the self-acting ventilating shafts of the upper wards should be arranged in one or more rows upon the roof according to the requirements of the ward, the shafts being contained in the

false roof, and their lower terminations opening into it. At a sufficient distance from the lower extremities of the shafts the ceiling should extend and this should be perforated freely, and in such ornamental designs as might be desired (affording no small scope for the decorative genius of the architect). The ceiling would act as a diaphragm to break and diffuse the currents of air, and it would also prevent the rapid reduction of the temperature of the apartment by a free introduction of fresh air from above. The arrangement of the shafts of the ventilators in the roof, would enable the architect to luxuriate in high pitched, double, ornamental roofs. If the ward had windows on both sides, and was warmed with stoves (for it is doubtful whether an open fire place would be consistent with self-acting roof ventilation) as perfect a ventilated apartment would exist as could be desired; for if the roof ventilation came to a stand-still, from the temperature of the outer and inner air approximating, the windows would then come into use as ventilators; and in winter the self-acting roof ventilation would be the more effective the closer the windows and doors were shut, and the more fully the stoves were in action. Not any, or but slight, discomforts would be experienced under these circumstances, by patients or attendants, from erratic draughts flowing from open windows or doors, or from inlets for the outer air near the floor, and still sufficient change of air might be obtained for all sanitary purposes. The same principle might be carried out in the lower wards by making an air chamber between the ceiling and the floor above, and fixing the ventilating shafts obliquely within it, so as to open upon the external wall, by ornamental perforated work. This would not necessitate so great an increase in actual loftiness of wards as might at first be supposed, because from the use to which the ceiling would be put it would not require to be placed at that height above the floor at which it is now most commonly placed.

By the use of a diaphragm and *quasi* air chamber, as in the above example, I believe that any objections which have been attached to the self-acting roof system of ventilation, may be in great measure avoided and its usefulness extended. This system seems to me well worthy of consideration, when in building hospitals or other public buildings, factories, etc., simplicity and inexpensiveness of style is required with effective ventilation, and it is probable that this system may be of more extensive application than is commonly supposed. In large cellular buildings, as gaols and lunatic asylums, a forced system of ventilation, plenum or vacuum, must usually be had

recourse to; but there are many smaller buildings where the self-acting system of roof ventilation, in addition to the doors and windows, would probably meet every sanitary want, and remove or very greatly diminish the discomforts arising from draughts in boisterous, tempestuous, and cold weather.

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## ON THE INFLUENCE OF THE SEASONS OF THE YEAR, EMPLOYMENT, PERIOD OF IMPRISONMENT, ETC., ON THE GAIN OR LOSS OF WEIGHT, BY THE PRISONERS CONFINED IN THE CONVICT PRISON AT WAKEFIELD, BETWEEN JANUARY 1, 1848, AND DECEMBER 31, 1857.

By W. R. MILNER, Surgeon.

THE prisoners upon whom my observations have been made, are men who have had sentences of transportation or penal servitude passed upon them, and who have been sent to Wakefield to undergo the first portion of their punishment, during which they are kept in separate cells for a period of about nine months.

The prisoners are all males, between the ages of sixteen and fifty, and are all presumed to be in good health when sent. The cells in which they are confined have a cubic capacity of about nine hundred feet, and from thirty to thirty-five cubic feet of air, per minute, are passed through each cell.

The mean temperature of the cells for the entire year was 61°; the highest monthly mean 66·5° occurred in August; the lowest 56·9° in March.

The diet is uniform, with the exception of the alterations ordered by the medical officer in individual cases, and consists of the following articles daily:—Bread, twenty ounces; meat without bone, four ounces; soup, half a pint (these are equivalent to about seven ounces and three quarters of butcher's meat); potatoes, one pound; skimmed milk, three quarters of a pint; gruel, one pint, containing two ounces of oatmeal.

The dress is, cloth jacket, waistcoat, trousers, cap, and stock; linen shirt; woollen stockings, drawers, and under shirt.

The prisoners are sent out to exercise in the open air nine hours a week; the exercise is for one hour at a time; the men walk in circles, and every ten minutes they run for a hundred and fifty yards. They are all supplied with work, and are for the greater part employed in making mats, and matting of cocoa fibre and other materials; some work at tailoring, and shoemaking, and a few have other work to do.

All the prisoners are weighed on admission, and at the latter end of every calendar month during their stay.

The number of prisoners over whom my observations extend has been four thousand; the period of time occupied, ten years; the average number weighed monthly, three hundred and seventy-two; and the total number of individual weighings, forty-four thousand and four.

The men have all been weighed by myself, or under my superintendence; and the series of observations has been unbroken.

The results of these weighings have been tabulated on various bases, with a view to isolate the effect of a certain number of variable conditions on the gain, or loss of weight, among these prisoners, and to determine the amount of influence exerted by each of these conditions.

The conditions which I have selected for investigation, are:

1. The season of the year;
2. The period of imprisonment;
3. The employment in prison;
4. The age of the prisoners on admission;
5. The height ditto.

The influence exerted by each of these conditions is well marked, and, with one exception, viz., the influence of season, the deductions are such as would have been anticipated. I am not, however, aware that any similar observations have yet been published extending over so long a period, applied to so large a number of men, and carried out under such favourable circumstances. I can speak confidently as to the care and accuracy employed, both in taking and in working up the observations; and therefore, although they may not bring out any new physiological laws, they may form useful raw material to be employed by some future labourer in the same field.

## INFLUENCE OF SEASON.

The first table shows the influence of the season of the year on the weight of a number of men placed during the entire year under circumstances of food, clothing, and work, which do not differ, and who for the greater part of the day are in a temperature which does not vary greatly between the hottest and the coldest months. Under such circumstances, it might be expected that the weight of the men, taken as a whole, would remain sensibly the same; and that the numbers losing or gaining, as well as the quantities lost or gained, would vary little month by month; or that, if any marked variation occurred, it would be of an accidental character, depending on the

greater or less amount of sickness during any particular month, etc. The inspection of Table I, however, shows that a marked periodicity exists ; and that, taking an average of years, we have two distinct series of months, during the one of which there is a constant loss of weight, and during the other a constant gain ; so that, if we divide the year into quarters, there is a loss during the first and fourth quarters, and a gain during the second and third.

The two series of gaining and losing months are unbroken, except in one instance. On reference to the table it will be seen that in November, which is in the losing series, a gain occurred. The amount gained is very small ; and I believe the discrepancy was caused by the arrival of large numbers of prisoners in September and October. It will be shown under another head that the men usually gain weight for a short time after they are received, so that probably this break in the series results from the influence of the stage of imprisonment, rather more than balancing the influence of season. On looking down the columns which show the average gain or loss per prisoner weighed, it will be seen that, beginning at December, the amount lost per man increases rapidly, and very steadily, till March, but that between March and April there is a very abrupt transition from loss to gain. The gains then continue till August, the amount gained increasing on the whole, but by a series of jerks, each alternate month presenting a larger and a smaller gain respectively, so that to obtain a steadily increasing series we should have to couple the summer months in pairs. Between August and September a change of sign occurs, about equal in amount, but in the opposite direction to that which took place between March and April.

The changes between March-April, and August-September, are far greater in amount than the changes which take place between any other pairs of consecutive months ; and this remark applies with greater force to the percentages of men gaining or losing, and to the net gains and losses, than to the average gains or losses per man.

The inferences which I think may be fairly drawn from these observations, are :—

1. The body becomes heavier during the summer months, and the gain varies in an increasing ratio.

2. The body becomes lighter during the winter months, and the loss varies in an increasing ratio.

3. The changes from gain to loss, and the reverse, are abrupt and take place about the end of March, and the beginning of September.

The results which I have thus obtained from the discussion of a large number of periodical weighings, present a remarkable relation to the results obtained by Dr. Edward Smith, from a series of most valuable and elaborate experiments which he has made on the quantities of carbonic acid thrown off by the lungs at various seasons of the year.

For instance, Dr. Smith finds that the quantity of carbonic acid thrown off is much greater in winter than in summer. My weighings show that the prisoners lost weight in winter, when the evolution of carbonic acid was great, and gained weight in summer, when less carbonic acid was given out.

This in itself would be a striking coincidence; but it will be seen from Table I, that a sudden change took place between March and April, and at the same time of the year, Dr. Smith found that a similar change took place in the amount of carbonic acid thrown off, and that the *amount* of the change was much greater at that period than at any other time, and so much greater that the great alteration struck him as being a very remarkable circumstance. Dr. Smith's paper was read at the Leeds meeting of the British Association, and his observations did not extend to the August-September period. I am therefore, unable to say if any equally marked change takes place in autumn. There can be little doubt that variations of temperature, light, etc., are the principal agents in causing these changes, but I believe it will be found that in addition to the direct influence of these physical agents, a periodic action occurs in the system which adds to or diminishes the effect of the physical agents alone.

### STAGE OF IMPRISONMENT.

I have divided the time passed at Wakefield into periods of two months each, and have tabulated six of these periods, so as to show the variation of the weight of the men during the first twelve months of their stay. I have not carried the table any further, as very few prisoners remained longer than twelve months, and those who were kept beyond that time were chiefly invalids, and consequently, cases from which no general inferences could be fairly drawn.

The table shows the gains and losses in bi-monthly periods, and also the proportion of prisoners who had to be placed on the extra-diet list, who were put on the list during each period. The number placed on extra diet, during the first twelve months of their stay, was 1,393, out of which number 3·14 per cent. were put on during the first two months, and 12·31 per cent. during the second two months.

The stage of their imprisonment here had evidently a very marked effect; during the first two months the majority gained weight; in the second bi-monthly period a large loss occurred, equal to nearly twice the amount gained in the first period; in the third period there was still a loss, but not to so great an amount; the next three periods show a steadily increasing gain.

For a due understanding of these fluctuations, it is necessary to consider the circumstances under which prisoners are received into this prison. They are all brought from other prisons after having been tried, and sentenced to various periods of transportation, or penal servitude; they have consequently passed through the period of anxiety which elapses between committal and trial, during which time, I have reason to think, men often fall off very much in condition and health. When we receive them their fate is decided, and they know the worst. In a large proportion of cases, I believe this is followed by a feeling of relief, and by a reaction of the mind against the depression under which it had previously been suffering; later on, the continued imprisonment begins to tell, and it becomes necessary to give extra diet to counteract its depressing tendency. A reference to the tables shows that it was thought necessary to give extra diet to a large number of prisoners during the fifth, sixth, seventh, and eighth months.

The number of prisoners who were placed on the extra diet list for the first time during these four months was 833, being nearly twenty-one per cent. of the prisoners in confinement, and sixty per cent. of the whole number who were put on extra diet during the twelve months.

The effect of this addition to the diet is shown by the gradual and progressive improvement during the last three bi-monthly periods, when the amount gained, added to the gain of the first period, has nearly restored the equilibrium of the mass.

In the preceding tables, the basis of the calculations has been the monthly weighings; but in those which are to follow, the basis of the calculations is the difference between the weights of the prisoners when received, and when removed, and consequently represents the entire loss or gain during an average period of 326 days.

### PRISON EMPLOYMENT.

In Table III, I have distributed the various employments of the prisoners into five groups, putting into each group the classes of workmen, who, as a class, were most nearly associated in the average amounts gained or lost during their stay,

and, when arranged on this principle, it will be found that the groups also represent very accurately the amount of muscular force required to be expended in the respective kinds of work at which they were employed. The first group consists of men employed in picking coir, an occupation in which the labour is merely nominal; and it will be seen that these men gained nearly two pounds each on the average, and that a large per centage of them were gaining weight. The coir pickers are placed in a group by themselves, as they consist principally of exceptional cases, a large proportion of them being men who, from weakness or infirmity, were unfit for real labour; many were, on medical grounds, employed in the garden, and had extra allowances.

The next group contains men working at sedentary trades, as tailors, and shoemakers, as well as a few employed in writing, and other light occupations. Of these men a large per centage gained weight, and the average gain was nearly a pound and three quarters per man.

The group which follows comprises carpenters, mechanics, and men employed in winding the yarn into balls, or winding it on to bobbins for the mat-makers. The men in this group generally work standing, and therefore, a greater number of muscles have to be brought into play. The weight of work, however, is thrown on the arms, and the legs have little more to do than to support the body in a convenient attitude. A smaller per centage of these gained weight, and the average amount gained was less.

The fourth group contains the men employed in weaving canvas, in making mats in the loom, or on boards, and also a small number, thirty-six, who were engaged in plaiting coir, or in binding mats. The work of all these men is decidedly heavier than that of the men forming the preceding groups, and the majority of these were found to have lost weight.

The last group contains only one class of work, viz, the weaving of coir-matting; but the effects of this were so very decided, that it was necessary to give it a place to itself.

The weaving of coir-matting by hand is a very laborious occupation; the yarn is coarse and rough, so that the friction between the threads of the warp and weft is great, and to produce good firm work, the weft has to be heavily and repeatedly struck, in doing which the muscles of the arms and trunk are brought into powerful action; the legs have also to be employed in working the treddles, and, in consequence of the power required to work the loom, the weaver cannot work sitting.

The effect of this greater expenditure of muscular force is very manifest, for nearly eighty per cent. of the men so employed lost weight during their stay, and the average loss per man was nearly seven pounds.

The influence of the various employments would have been much more marked if it had not been, to some degree, counteracted by the extra diet given to those men who were falling off very much in weight, and the numbers to whom it was found necessary to give extra diet, in each class, also bore a pretty close relation to the amount of muscular force expended. Among the men employed in coir-picking, 26·8 per cent. had to be placed on extra diet; in the second group, 26·4 per cent.; in the third, 36·8 per cent.; in the fourth group, 39·4 per cent.; while of the matting weavers, 60·1 per cent. required additional food.

## AGE.

The average age of the four thousand prisoners when received, was twenty-six years and a half; above twenty-five per cent. were under twenty-one years old, and fifty-two per cent. were under twenty-four; a large proportion of them, therefore, were still growing.

When grouped according to age, as in Table IV, it appears that the younger men gained weight, the middle aged lost, and the older men gained; also, that the younger the men were, the greater the amouut gained. If, however, we were to infer from this, that imprisonment was less injurious to the young, or that the food supplied to them had been more than sufficient to keep them in health, we should be in error.

According to Quetelet, the average rate of increase for one year in males, is as follows :—

| | Age. | | Age. | | | lbs. |
|---|---|---|---|---|---|---|
| From | 17 | to | 18 | = | + | 8·5 |
| | 18 | „ | 19 | = | + | 4·4 |
| | 19 | „ | 20 | = | + | 3·9 |
| | 20 | „ | 25 | = | + | 1·5 |
| | 25 | „ | 30 | = | + | 0·3 |
| | 30 | „ | 40 | = | | 0·0 |
| | 40 | „ | 50 | = | — | 0·3 |

Now, the prisoners who were received at seventeen, ought, during their stay with us, averaging about 326 days, to have gained 7·59 pounds per man; but they only gained 2·81 pounds, consequently, there was an average virtual loss of 4·78 pounds; and, applying the same principle of correction to the other ages, it will be found that there was a virtual loss on all ages below forty in the following proportion :—

| Age. | lbs. |
|---|---|
| 17 | 4·78 |
| 18 | 1·61 |
| 19 | 2·42 |
| 20 | 1·39 |
| 21—24 | 1·33 |
| 25—30 | 0·37 |
| 30—40 | 0·90 |

The men above forty, gained 1·07 each.

If we take the prisoners at seventeen as one group, and then take the next six ages in pairs, we shall have the virtual losses represented by the following figures, at 17, 4·78 pounds; at 18-19, 2·02 pounds; at 20-24, 1·36 pound; at 25-40, 1·14 pound; showing a regular decrease in the virtual loss as the age increases.

The loss of weight is one of the data on which I form my opinion as to the necessity for giving a prisoner extra food, and I was not for some time so fully alive to the importance of giving a larger quantity of food to the young. The extra diets have therefore been distributed pretty equally over all ages; a rather larger proportion has fallen to the share of the younger prisoners, but the difference has been so slight as not to have been capable of producing any marked effect, and the figures may, I think, be taken to represent pretty fairly the relative wants of the system at different ages.

### HEIGHT.

The average height of the men, measured without their shoes, was 65·4 inches, and the number above and below that height were about equal.

By referring to Table V, it will be seen that the gains and losses in weight varied with the height, the shortest men gaining most; those between fifty-nine and sixty-two inches high, gaining less; between sixty-three and sixty-six, where the mean height falls, being stationary; those above this height losing, and the loss becoming gradually greater as the height increases.

These differences would have been much more marked, if the men had all been kept strictly to their ordinary diet; but it has always been found necessary to put a large proportion of the tall men on extra diet. Out of the total number who had more than the usual allowance of food, there were—Under fifty-nine inches, 20·0 per cent.; from fifty-nine to sixty-two, 25·9; sixty-three to sixty-six, 33·2; sixty-seven to seventy, 44·5; seventy to seventy-four, 56·9. Of the whole 4,000 prisoners, 1,414, or 35·3 per cent, were placed on extra diet.

The per centage of prisoners who were placed on extra diet

does not, however, represent the whole case, for the length of time the prisoners were on extra diet, or, in other words, the time when it became necessary to give additional food, varied. Thus, of the prisoners who were placed on the extra diet list, those who were under sixty-three inches were on it, on the average, 3·99 months; sixty-three to sixty-six inches, 4·27 months; sixty-seven to seventy inches, 4·82 months; and the men of seventy-one to seventy-four inches, 5·65 months; so that the tall men, who had extra food allowed, had it nearly fifty per cent. longer than the short men.

From a consideration of the facts which I have collected, I think we may fairly infer that there is a periodic variation in the weight of man during the year, the six summer months being gaining, and the six winter months being losing months. The amounts gained or lost, gradually increase from the commencement till the termination of each period respectively; the change from the gaining to the losing period, and the converse, is, however, abrupt, and these changes take place at times not very distant from the vernal and autumnal equinoxes.

When men, differing in labour, age, and height, are fed on an uniform diet, the amount of which is not quite sufficient to keep the weight of the whole mass in equilibrium, one portion of them gains while the other loses weight.

(*a*). Those whose work requires a small expenditure of muscular force, gain weight; those whose work requires a large expenditure of muscular force, lose weight; and the loss of weight varies with the amount of muscular force expended.

(*b*). Those who are below twenty years of age, gain weight *actually*, but, as they do not gain as much as they ought to have done by growth in the time, they *virtually* lose; between twenty and forty, there is an actual loss; those above forty, gain, and the virtual losses of those below forty, vary inversely with the ages.

(*c*). Those below the average height, gain weight; those about the average height, remain stationary; while those above it, lose weight, and the amount of loss or gain increases, in proportion as the height varies from the mean. The amounts lost by the tall men are, however, rather larger than the amounts gained by the short men.

These facts show the impossibility of framing any uniform dietary which can be suitable to a body of men among whom great individual differences exist, and they also show how necessary it is to allow a large discretionary power of giving extra food, to a medical officer, having charge of men who are

unable to obtain any food, except that supplied to them by the authorities under whom they are placed.

The results of this investigation show the fallacy of the absurd notion which some people have, that prisoners are pampered and fed up in prison; for there was an actual loss on the whole weighings, although 3,635 were under forty years of age. Now, according to Quetelet, the weight of man continues to increase up to forty years, and therefore, by natural growth, there should have been a gain upon those 3,635 men, if they had had food sufficient to make up for the wear of the system, and leave a margin for growth. Now, taking Quetelet's tables as representing the normal growth of man, and multiplying the annual increase as shewn in those tables by the number of men at each age, and by the average duration of their stay at Wakefield, the prisoners under forty, ought to have weighed 3,750 pounds more at departure, than on arrival, instead of which they weighed 1175·5 pounds less, and were. therefore, 4925·5 pounds lighter, when they went away, than they probably would have been if they had been at liberty, and could have had as much food as they had chosen to eat.

It is evident, therefore, that the prisoners have not been supplied with an excess of food.

In conclusion, I would observe that although the average net gains or losses is small in amount, the regularity with which they vary according to the variation of the conditions which have been made the subjects of comparison, proves the general correctness of the deductions drawn from them, especially when we consider how much the losses have been diminished by the quantities of extra diet which were given to those men in whom the ordinary diet was evidently not sufficient; and the tolerably regular manner in which the amounts of extra diet ran side by side with the losses, I think, proves that a proper care was exercised in selecting the cases in which additional food was thought necessary.

TABLE I.

| Month. | No. of prisoners weighed. | Number of Prisoners | | | Percentage of Prisoners | | | Number of Pounds | | Net | | Average | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Gaining weight. | Losing weight. | Station-ary. | Gaining weight. | Losing weight. | Station-ary. | Gained. | Lost. | Gain. | Loss. | Gain per prisoner gaining. | Loss per prisoner losing. | Gain per prisoner weighed | Loss per prisoner weighed |
| January - - | 3,879 | 1,645 | 1,918 | 316 | 42·4 | 49·4 | 8·2 | 3723·5 | 4274·0 | — | 550·5 | 2·26 | 2·25 | — | 0·14 |
| February - - | 3,747 | 1,561 | 1,808 | 378 | 41·6 | 48·3 | 10·1 | 3140·0 | 4051·0 | — | 911·0 | 2·01 | 2·24 | — | 0·24 |
| March - - - | 3,632 | 1,058 | 2,272 | 302 | 29·1 | 62·6 | 8·3 | 1918·5 | 5372·5 | — | 3454·0 | 1·81 | 2·37 | — | 0·95 |
| April - - - | 3,793 | 1,733 | 1,704 | 356 | 45·7 | 44·9 | 9·4 | 3710·0 | 3578·5 | 131·5 | — | 2·14 | 2·10 | 0·03 | — |
| May - - - | 3,673 | 1,627 | 1,694 | 352 | 44·3 | 46·1 | 9·6 | 3825·5 | 3795·0 | 30·5 | — | 2·35 | 2·24 | 0·01 | — |
| June - - - | 3,731 | 1,918 | 1,455 | 358 | 51·4 | 39·0 | 9·6 | 5322·0 | 3381·0 | 1941·0 | — | 2·77 | 2·32 | 0·52 | — |
| July - - - - | 3,511 | 1,622 | 1,546 | 343 | 46·2 | 44·0 | 9·8 | 3426·5 | 3135·5 | 291·0 | — | 2·11 | 2·04 | 0·08 | — |
| August - - - | 3,446 | 1,903 | 1,211 | 332 | 55·2 | 35·1 | 9·7 | 4879·5 | 2483·0 | 2396·5 | — | 2·56 | 2·05 | 0·70 | — |
| September - | 3,684 | 1,474 | 1,881 | 329 | 40·0 | 51·1 | 8·9 | 3303·0 | 4080·5 | — | 777·5 | 2·24 | 2·17 | — | 0·21 |
| October - - | 3,734 | 1,624 | 1,768 | 342 | 43·5 | 47·3 | 9·2 | 3515·0 | 3905·0 | — | 390·0 | 2·16 | 2·21 | — | 0·10 |
| November - - | 3,621 | 1,636 | 1,613 | 372 | 45·2 | 44·5 | 10·3 | 3345·5 | 3329·5 | 16·0 | — | 2·04 | 2·06 | 0·004 | — |
| December - - | 3,553 | 1,519 | 1,682 | 352 | 42·8 | 47·3 | 9·9 | 3237·0 | 3356·0 | — | 119·0 | 2·13 | 1·99 | — | 0·03 |
| First quarter - | 11,258 | 4,264 | 5,998 | 996 | 37·9 | 53·3 | 8·8 | 8782·0 | 13697·5 | — | 4915·5 | 2·06 | 2·29 | — | 0·44 |
| Second quarter | 11,197 | 5,278 | 4,853 | 1066 | 47·1 | 43·4 | 9·5 | 12857·5 | 10754·5 | 2103·0 | — | 2 44 | 2·22 | 0·19 | — |
| Third quarter | 10,641 | 4,999 | 4,638 | 1004 | 47·0 | 43·6 | 9·4 | 11609·0 | 9699·0 | 1910·0 | — | 2·32 | 2·09 | 0·17 | — |
| Fourth quarter | 10,908 | 4,779 | 5,063 | 1066 | 43·8 | 46·4 | 9·8 | 10097·5 | 10590·5 | — | 493·0 | 2·11 | 2·09 | — | 0·05 |
| Winter months | 22,166 | 9,043 | 11,061 | 2062 | 40·8 | 49·9 | 9·3 | 18879·5 | 24288·0 | — | 5408·5 | 2·09 | 2·90 | — | 0·24 |
| Summer mo. - | 21,838 | 10,277 | 9,491 | 2070 | 47·0 | 43·5 | 9·5 | 24466·5 | 20453·5 | 4013·0 | — | 2·38 | 2·16 | 0·18 | — |
| Whole year - | 44,004 | 19,320 | 20,552 | 4132 | 43·9 | 46·7 | 9·4 | 43346·0 | 44741·5 | — | 1395·5 | 2·24 | 2·18 | — | 0·03 |

## TABLE II.

| Stage of Imprisonment at Wakefield. | No. of prisoners weighed. | Number of Prisoners | | | Percentage of Prisoners | | | No. of Pounds | | Net | | Average | | | | Percentage placed on extra diet. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Gaining weight. | Losing weight. | Station-ary. | Gaining weight. | Losing weight | Station-ary. | Gained. | Lost. | Gain. | Loss. | Gain per prisoner gaining. | Loss per prisoner losing. | Gain per prisoner weighed | Loss per prisoner weighed | |
| First & second mo. | 7980 | 3901 | 3374 | 705 | 48·9 | 42·3 | 8·8 | 10028·0 | 8108·5 | 1929·5 | — | 2·57 | 2·40 | 0·24 | — | 3·14 |
| Third & fourth „ | 7880 | 2988 | 4141 | 751 | 37·9 | 52·6 | 9·5 | 5769·0 | 9383·0 | — | 3614·0 | 1·93 | 2·27 | — | 0·46 | 12·21 |
| Fifth & sixth „ | 7663 | 3090 | 3833 | 740 | 40·3 | 50·0 | 9·7 | 6562·5 | 8186·5 | — | 1624·0 | 2·12 | 2·14 | — | 0·21 | 29·81 |
| Seventh & eighth | 6715 | 2968 | 3044 | 703 | 44·2 | 45·3 | 10·5 | 6477·0 | 6009·0 | 468.0 | — | 2·18 | 1·97 | 0·07 | — | 29·98 |
| Ninth & tenth „ | 5211 | 2331 | 2319 | 561 | 44·7 | 44·5 | 10·8 | 5243·5 | 4630·0 | 613·5 | — | 2·25 | 2·0 | 0·12 | — | 15·98 |
| Eleventh & twelfth | 3277 | 1547 | 1363 | 367 | 47·2 | 41·6 | 11·2 | 3351·5 | 2800·5 | 551·0 | — | 3·17 | 2·05 | 6·17 | — | 8·88 |
| Total - - - | 38726 | 16825 | 18074 | 3827 | 43·4 | 46·7 | 9·9 | 37441·5 | 30117·5 | — | 1676·0 | 2·22 | 2·17 | — | 0·04 | 100·00 |

## TABLE III.

| Employment in Wakefield Prison. | No. of prisoners weighed. | Number of Prisoners | | | Percentage of Prisoners | | | No. of Pounds | | Net | | Average | | | | Percentage on extra diet. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Gaining weight. | Losing weight. | Station-ary. | Gaining weight. | Losing weight. | Station-ary. | Gained. | Lost. | Gain. | Loss. | Gain per prisoner gaining. | Loss per prisoner losing. | Gain per prisoner weighed | Loss per prisoner weighed | |
| Coir pickers - - | 71 | 40 | 23 | 8 | 56·3 | 32·4 | 11·3 | 311·5 | 181·5 | 130·0 | — | 7·79 | 7·89 | 1·83 | — | 26·8 |
| Tailors - - - | | | | | | | | | | | | | | | | |
| Shoemakers - | 1411 | 812 | 524 | 75 | 57·6 | 37·1 | 5·3 | 5009·0 | 2691·5 | 5407·5 | — | 6·17 | 4·96 | 1·71 | — | 26·4 |
| Miscellaneous - | | | | | | | | | | | | | | | | |
| Carpenters - - | | | | | | | | | | | | | | | | |
| Mechanics - - | 269 | 147 | 107 | 15 | 54·6 | 39·8 | 5·6 | 966·0 | 686·0 | 324·0 | — | 6·56 | 5·94 | 1·20 | — | 36·8 |
| Winders - - - | | | | | | | | | | | | | | | | |
| Mat makers - | | | | | | | | | | | | | | | | |
| Mat weavers - | | | | | | | | | | | | | | | | |
| Canvas weavers | 2064 | 826 | 1152 | 86 | 40·0 | 55·8 | 4·2 | 4555·0 | 6881·5 | — | 2326·5 | 5·51 | 5·97 | — | 1·13 | 39·4 |
| Mat finishers - | | | | | | | | | | | | | | | | |
| Coir plaiters - | | | | | | | | | | | | | | | | |
| Matting weavers - | 185 | 37 | 145 | 3 | 20·0 | 78·4 | 1·6 | 180·0 | 1441·0 | — | 1261·0 | 4·87 | 9·94 | — | 6·81 | 60·1 |
| Total - - - | 4000 | 1862 | 1951 | 187 | 46·5 | 48·8 | 4·7 | 11015·5 | 11740·5 | — | 725 | 5·92 | 6·02 | — | 0·18 | 35·3 |

TABLE IV.

| Age. | No. of prisoners weighed. | Number of Prisoners | | | Percentage of Prisoners | | | Number of Pounds | | Net | | Average | | | | Percentage on extra diet. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Gaining weight. | Losing weight. | Station-ary. | Gaining weight. | Losing weight. | Station-ary. | Gained. | Lost. | Gain. | Loss. | Gain per prisoner gaining | Loss per prisoner losing. | Gain per prisoner weighed | Loss per prisoner weighed | |
| 17 - - - - | 62 | 37 | 22 | 3 | 59·7 | 35·5 | 4·8 | 273·5 | 99·0 | 174·5 | — | 7·39 | 4·50 | 2·81 | — | |
| 18 - - - - | 288 | 180 | 100 | 8 | 62·5 | 34·7 | 2·8 | 1098·0 | 430·5 | 667·5 | — | 6·10 | 4·31 | 2·32 | — | |
| 19 - - - - | 334 | 178 | 136 | 20 | 53·3 | 40·7 | 6·0 | 989·0 | 632·5 | 356·5 | — | 5·56 | 4·65 | 1·07 | — | |
| 20 - - - - | 330 | 150 | 161 | 19 | 45·5 | 48·8 | 5·7 | 801·0 | 816·5 | — | 15·5 | 5·34 | 5·07 | — | 0·05 | |
| 21 — 24 - - | 1059 | 444 | 577 | 38 | 41·9 | 54·5 | 3·6 | 2390·0 | 3518·5 | — | 1128·5 | 5·38 | 6·10 | — | 1·06 | |
| 25 — 30 - - | 940 | 438 | 460 | 42 | 46·6 | 49·0 | 4·4 | 2648·0 | 2999·5 | — | 351·5 | 6·05 | 6·52 | — | 0·37 | |
| 31 — 40 - - | 704 | 284 | 379 | 41 | 40·3 | 53·8 | 5·9 | 1830 5 | 2586·5 | — | 756·0 | 6·45 | 6·82 | — | 1·07 | |
| 41 & upwards | 283 | 151 | 116 | 16 | 53·3 | 41·0 | 5·7 | 985·5 | 657·5 | 328·0 | — | 6·53 | 5·67 | 1·16 | — | |
| Total - - | 4000 | 1862 | 1951 | 187 | 46·5 | 48·8 | 4·7 | 11015·5 | 11740·5 | — | 725·0 | 5·92 | 6·02 | — | 0·18 | |

TABLE V.

| Height in Inches. | No. of prisoners weighed. | Number of Prisoners | | | Percentage of Prisoners | | | Number of Pounds | | Net | | Average | | | | Percentage on extra diet. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Gaining weight. | Losing weight. | Station-ary. | Gaining weight. | Losing weight. | Station-ary. | Gained. | Lost. | Gain | Loss. | Gain per prisoner gaining. | Loss per prisoner losing. | Gain per prisoner weighed | Loss per prisoner weighed | |
| Under 59 - | 20 | 10 | 9 | 1 | 50·0 | 45·0 | 5·0 | 57·5 | 40·0 | 17·5 | — | 5·75 | 4·44 | 0 87 | — | 20·0 |
| 59 — 62 - | 567 | 278 | 267 | 22 | 49·1 | 47·1 | 3·8 | 1570·5 | 1332·5 | 238·0 | — | 5·65 | 4·99 | 0·42 | — | 25·9 |
| 63 — 66 - | 2343 | 1123 | 1103 | 117 | 47·9 | 47·1 | 5·0 | 6351·0 | 6308·0 | — | 43·0 | 5·66 | 5·72 | — | 0·02 | 33·2 |
| 67 — 70 - | 1005 | 422 | 537 | 46 | 42·0 | 53·4 | 4·6 | 2830·5 | 3782·5 | — | 952·0 | 6·71 | 7·04 | — | 0·95 | 44·5 |
| 71 — 74 - | 65 | 29 | 35 | 1 | 44·6 | 53·9 | 1·5 | 306·0 | 277·5 | — | 71·5 | 7·10 | 7·93 | — | 1·10 | 56·9 |
| Total - - | 4000 | 1862 | 1951 | 187 | 46·5 | 4·88 | 4·7 | 11015·5 | 11740·5 | — | 725·0 | 5·92 | 6·02 | — | 0·18 | 35·3 |

# ON THE USE OF THE MOUSTACHE AND BEARD IN THE ROYAL NAVY.

By DANIEL JOHN DUIGAN, M.D., F.R.C.S.I., Surgeon, *R.N.*

DURING the late war with Russia the English soldier was permitted to wear his beard and moustache—the marks of manhood, furnished by nature to some wise end.

The seamen who co-operated with the troops, under the appellation of the Naval Brigade, followed the example of the soldiers. Since the war, the army has been suffered to retain the beard and moustache (under certain regulations), whilst the navy has been compelled to resume the use of the razor. On physiological grounds, I beg to recommend the growth of facial hair, more especially for the seamen and marines (including the officers) serving in Her Majesty's navy. The moustache and beard protect a man from the inhalation of dust, from solar blistering, from diseases of the respiratory organs, and from malarious influence. I do not assert that they serve these good purposes absolutely, but they give most efficient aid.

(*a*). Facial hair protects the air-passages from dust.

Now that the steam-engine has come into general use in the ships of the Royal Navy, this is a subject of interest to every man in the service, and especially to the engineers and stokers. The operation of saturating the ashes with water, causes a cloud of impalpable dust and steam, which envelopes the men engaged in the duty.

"Trimming coal," and "coaling the ship," are attended by much dust; and tube-cleaning is distressing to the men to such a degree, as to cause them to wear a piece of bunting over the mouth as a respirator.

In addition to coal-dust the seamen are exposed, on certain stations, to an impalpable powder conveyed in the air out to sea for a considerable distance from the land. This is the case on the Mediterranean station, at Malta, and in the vicinity of the Egyptian shore. On the West African station, too, the same evil is experienced. Dr. Bryson* writes respecting the Bay of Portendico—

"In this locality, from its proximity to the great Desert of Sahara, the harmettan is more severely felt than upon any other part of the station. It chiefly prevails during the months of December, January, and February; from its ex-

* See "Report on the Climate and Principal Diseases of the African Station".

treme dryness, it has the effect of imparting to the mucous membrane of the lips, nose, and eyes, the sensation of being parched. The first two blister and crack, while the last become inflamed. . . . But the most remarkable phenomenon attending it, is the quantity of impalpable sand that it brings from the desert, which, from its wonderful subtilty, penetrates even the smallest crevice. . . . Every person exposed on deck for a few hours is so covered with dust, that he presents more the appearance of a miller than of a seafaring man."

Another source of dust on shipboard is the dry holystoning of the decks.

In all these instances the moustache opposes a barrier to the entrance of the dust, and thus renders good service.

(*b*). Facial hair is protective against solar blistering.

Blistering of the skin is a common effect of exposure to the sun's rays in hot climates. This annoying effect of heat is mitigated by a hairy covering to the skin.

(*c*). Facial hair protects the respiratory organs.

The first indication of a damp atmosphere is the moisture upon the moustache, due to the hygrometric quality of hair. The wearer of the moustache derives very great comfort from nature's respirator, for the moisture trickles away by the side of the mouth in lieu of entering the air passages. The hairy respirator removes the water from the air, and acts thus as a desiccating body. The natural heat of the surface of the face and throat are kept up by the beard, and the individual possessing this noble ornament escapes from a long list of inflammatory affections, amongst which I may enumerate soreness of the throat, catarrh, bronchitis, and herpes labialis. He is also saved from the torture of pains in the jaws, due to neuralgia and rheumatism. I could mention other maladies from which the beard affords protection; but I forbear, lest I be thought to exaggerate on this subject. The exemption of the Naval Brigade in the Crimea from diseases of the respiratory organs was most remarkable. One officer shaved off his moustache (which was thick and bushy), on rejoining his ship. The immediate result was an attack of pulmonary inflammation, which well nigh cost him his life.

It is a common practice to apply a flannel roller to the throat when it is sore; the beard is nature's prophylactic roller, better than flannel after the cold has been caught.

(*d*). The moustache has been regarded by some writers as protective against the influence of malaria.

It is highly probable that a hairy covering to the mouth

and throat may act in this way by sustaining the warmth of the parts, and by rendering the inspired air dry.

There are observations to show that malarious influence can be broken in ways that are inexplicable, such as by a belt of trees, by a running stream, and such like. A gauze curtain is said to afford immunity at Padua. If such be the fact, a respirator ought equally to afford protection. The shepherds dwelling in the Campagna di Roma were formerly swept away in numbers by malarious fevers. Now, they are comparatively safe by attention to the laws of hygiene, namely, the erection of their dwellings at a high level, the use of flannel clothing, and the growth of their beards and moustachios.

In conclusion, I would observe that, apart from the sanitary view of the question, shaving is to the sailor a cruel operation. Circumstances are unfavourable to him. Taking them *seriatim*, they are as follows :—1. Blunt razor ; 2. Cold water; 3. Scanty supply of water; 4. Darkness, or insufficient artificial light; 5. Fragment of a looking glass (in consequence of previous breakage) ; 6. Rolling and pitching ship ; 7. Stiffness of face from exposure to cold air on the morning watch ; 8. Ill temper at being forced to shave.

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## WORKING AMONG RAGS.

By J. JARDINE MURRAY, Esq., Edinburgh.

In many of the inferior streets and alleys of the metropolis, and other towns, may be seen the tawdry stump-doll, or the dirty bunch of parti-coloured ribbons, overhanging the sign-board which indicates that the keeper of that dingy store is ever ready to give "the highest price for all descriptions of rags and bones, etc."

To such places are conveyed the shrived and worn-out garments no longer attractive to old clothes' men, clippings from the workrooms of the tailor and mantua-maker, and—as the police inform us—the semi-rotten shreds which have been scraped up by many a poor wanderer from among our daily consignments to the dust-cart. On account of "value received" their contributions are made over to the rag-collector, who cares not whence they come. His objects are the profitable increase of his tattered heaps and the speedy stuffing of his canvass or hempen bags; that he may shortly have it in his power to make over a ton of goods to some large dealer.

In the more extensive stores, women are employed to overhaul, dust, and sort the rags according to their fabric and

quality. Woollen materials are carefully prepared for the London market, to be ground down into "shoddy," and cunningly resuscitated into cloth by being mixed and interwoven with fresh wool. Rags and mixed fabrics are treated in much the same way, or devoted to the manufacture of some coarser kinds of paper.

Linen and cotton rags are sent to the paper-maker. In the process of sorting, silk and worsted pieces, seams, cordings, buttons, etc., are carefully removed, and thus accumulates a specially refuse heap. From being used in the manufacture of prussiate of potash, rags of this description formerly commanded a good price, but for some reason they were of late no longer in demand for this purpose; and, while apparently inapplicable to other uses, they were not sufficiently valuable as manure to induce farmers to obtain them. Such refuse accumulations therefore increased within the premises of rag-collectors; and, being in many cases piled in open court, were exposed to the influence of air and moisture and allowed to rot unheeded.

Hence a real nuisance, and hence a very proper outcry!

It cannot be matter of surprise that the police received numerous complaints from the inhabitants of neighbouring houses. For it may readily be supposed that noxious effluvia would be given off from loose heaps in such conditions, and it might even be argued that something like malarious emanations might result. Perhaps, few men would choose to visit the rag-store, and fewer still would wish to reside in its vicinity. The contents may have passed through many phases of an eventful history; the woollen portion may very possibly lend weight to the coat of many a man who shall wear his vestment in blissful ignorance of the sources whence it is derived; the linen and cotton portions are doubtless destined to undergo ennobling transformations, which shall make this substance the means of mental communication between man and man; but the present condition of the whole is really very inattractive.

Who can wonder then that the rag-collectors received little sympathy; and that, not content with removing the nuisance which had arisen in the manner explained, the Edinburgh police authorities made an attempt to prevent anyone in the rag-trade from having "more than one hundred weight of rags of any one description in any store, or more than one ton in any open court within the police bounds!"

As might have been anticipated, this attempt met with vigorous opposition from the parties concerned. It was as-

serted that rags were in no respect injurious, that workers among them are extremely healthy, and that the proposed restrictions would be equivalent to a total suppression of the trade. Meetings were held, and a committee was appointed to collect statistics. A printed list of questions was sent to each rag-collector, and another list to each paper-maker. Full answers were in most cases returned; and, as they have been placed at our disposal, we are enabled to present the following abstracts.

We may remark in passing, that in the most important of the above queries, the exclusive use of the word *epidemic* is unfortunate; for, as its derivation (ἐπὶ δῆμος) implies, this word is only applicable to a prevailing disease, or one which attacks a number of people in the same locality at the same time. The word indicated was, doubtless, *contagious* (contingo) or *catching*, a term referrible to such diseases as are communicable from one individual to another and conveyed to the recipient by particles of matter proceeding from the body of the sick, *e.g.*, carried on articles of clothing which have been converted into rags. But, from a careful examination of the answers above referred to, we are led to believe that such distinction was overlooked; and that, had the more correct term been employed, the returns would have been the same.

These statistics, though one-sided, are certainly interesting. That the answers from which they are compiled, were given in perfect good faith, we do not doubt. But if their strict accuracy be admitted, working among rags would be shown to be an occupation not only uninjurious, but positively beneficial to health.

Workers might be expected to suffer—1. From contagion; 2. From the products of decay of the animal and vegetable constituents of the rags—were such decay permitted to occur; 3. From inhaling and swallowing dust.

Let us shortly consider these influences.

1. When we consider whence a large portion of the home-collected rags are derived, it is difficult to see why they should not frequently be means of propagating contagious diseases. Considerable supplies are annually imported into this country from Leghorn, Trieste, and Palermo; and also from Germany through the ports of Bremen and Hamburgh; and it is equally difficult to understand why these should be free from pestiferous influence. It is worthy of remark, that quarantine was formerly enforced on rags imported from abroad, although we believe such precautions are no longer used.

But uniform testimony to the comparative immunity of

RAGS. *Abstract of Statistics from Paper-Makers, 5th September*, 1856.

| Name of Paper Mill. | How many years have you been in the trade? | Workpeople employed during the year. | Quantity of rags of all descriptions consumed annually. | Rags in store at one time on an average in the year. | Do you consider the storage of rags injurious to the health of your workers? | Workpeople seized with epidemic disease through working among rags. | | | Do you know if your workers are predisposed to disease from working among rags? or if any disease is peculiar to workers among rags? |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Seized. | Recov. | Died. | |
| | | | Tons. | Tons. | | | | | |
| Leslie paper mills | 9 | 100 | 800 | 150 | Not if dry | 0 | 0 | 0 | No |
| Kevock* | 8 | 50 | 572 | 50 | No | 0 | 0 | 0 | No |
| Kinleith | 12 | 100 | 650 | 150 | No | 0 | 0 | 0 | No |
| Bullionfield | | | | | | | | | |
| Portobello | 20 | 55 | 450 | 50 | No | 0 | 0 | 0 | No |
| Greenock | 20 | 65 | 550 | 50 | No | 0 | 0 | 0 | No |
| Moffat Mills, Airdrie | 20 | 100 | 500 | 100 | No | 0 | 0 | 0 | No |
| Stoneywood | 70 | 550 | 1800 | 900 | No | 0 | 0 | 0 | No |
| St. Leonard's† | 12 | 70 | 400 | 20 | No | 0 | 0 | 0 | No |
| Kates‡ | 15 | 70 | 475 | 125 | No | 0 | 0 | 0 | No |
| Dalbeattie | 29 | 6 | 30 | 4½ | No | 0 | 0 | 0 | No |
| Millbank | 11 | 50 | 300 | 35 | No | 0 | 0 | 0 | No |
| Potton§ | 40 | 185 | 600 | 230 | No | 3 | 3 | 0 | No |
| Balerno Bank | 14 | 57 | 512 | 15 | No | 0 | 0 | 0 | No |
| New Battle | 30 | 126 | 1500 | 100 | No | 0 | 0 | 0 | No |
| Strath Mill | 10 | 7 | 25 | 2½ | No | 0 | 0 | 0 | No |
| Muggie Moss‖ | 36 | 80 | 1100 | 275 | No | 0 | 0 | 0 | No |
| Vallyfield¶ | 90 | 480 | 1450 | 365 | No | 0 | 0 | 0 | No |
| Chirnside | 66 | 180 | 1200 | 200 | No | 0 | 0 | 0 | No |
| Crook of Dearn | 6 | 6 | 60 | 10 | No | 0 | 0 | 0 | No |
| Esk Mills | 35 | 250 | No return | 300 | No | 0 | 0 | 0 | No |
| Cheddar | 17 | 100 | 150 | 20 | No | 0 | 0 | 0 | No |
| Caldercrinx, Airdrie | 30 | 100 | 750 | 60 | No | 0 | 0 | 0 | No |

* The workpeople are fully as healthy as out-door workers. † The workers are even more healthy than the other residents in the village, who are employed at the carpet-works or in the fields. ‡ The proprietor's dwelling-house immediately adjoins the rag-stores. § Recently, the village of Loanhead was almost decimated by cholera. A large portion of our workers reside in this village; and there was not one death among them, but only two or three slight cases. ‖ The dust from the rags is injurious to the lungs. ¶ Some of those who work long at rag-cutting suffer in old age from shortness of breathing; but among a hundred and forty, who are constantly so occupied in our mill, there are very few such instances.

*Abstract of Statistics from Rag-Collectors, Edinburgh, September* 1856.

| Places of Business. | How long have you been in trade? | People employed on an average during the year. | Quantity of rags of all descriptions collected in the year on an average. | Workpeople seized with epidemic disease. | | | From your own experience, do you consider rags, when properly packed in bales, injurious to health? |
|---|---|---|---|---|---|---|---|
| | | | | Seized. | Recovered. | Died. | |
| | Years. | | Tons. | | | | |
| 163, West Port - - - | 6 | 3 | 80 | 0 | 0 | 0 | No |
| 177, Cowgate - - - | 5 | 5 | 26 | 0 | 0 | 0 | No |
| 7, Hays Court - - - | 7 | 4 | 160 (incl. bones) | 0 | 0 | 0 | No |
| 8, West Bow - - - | 5 | 2 | 15 | 0 | 0 | 0 | No |
| 6, Low Market Street - - | 12 | 3 | 90 | 0 | 0 | 0 | No |
| 32, Cowgate - - - | 13 | 3 | No return | 0 | 0 | 0 | No |
| 40, Grass Market - - - | 7 | 4 | 15 | 0 | 0 | 0 | No |
| 49, West Port - - - | 20 | 2 | 50 | 0 | 0 | 0 | No |
| 33, George IV Bridge* - - | 30 | 10 | 200 | 1 | 0 | 1 | No |
| 237, Canongate† - - - | 12½ | 3 | 75 | 1 | 1 | 0 | No |
| 57, Tollbooth Wynd, Leith - - | 2½ | 8 | 52 | 0 | 0 | 0 | No |
| Links Pottery, Kirkaldy - - | 45 | 3 | 135 | 0 | 0 | 0 | No |
| Coatfield Lane, Leith - - | 6 | 16 | 300 | 0 | 0 | 0 | No |
| 27, West Preston Street - - | 14 | 1 | 19 | 0 | 0 | 0 | No |
| 5, Tobago Street - - - | 1 | 2 | 8 | 0 | 0 | 0 | No |
| 84, Candlemaker Row‡ - - | 7 | 19 | 375 | 0 | 0 | 0 | No |
| 10, Bristo Place - - - | 3 | 9 | 300 | 0 | 0 | 0 | No |
| 203, Pleasance - - - | No return | 1 | No return | 0 | 0 | 0 | No |
| 54, Blackfriars Wynd - - | 4 | 3 | 50 | 0 | 0 | 0 | No |
| 114, Cowgate - - - | 5 | 1 | 2 | 0 | 0 | 0 | Not if dry |
| 149, Canongate - - - | 8 | 1 | 25 | 0 | 0 | 0 | No |
| 4, Crosscauseway - - - | 25 | 3 | No return | 0 | 0 | 0 | No |
| 60, West Port - - - | 6 | 2 | 100 | 0 | 0 | 0 | No |

* Only one death among our rag-workers during the last ten years. (But from what? old age or epidemic disease?) † This one woman was ill with fever. After a month's absence, she returned to her work. ‡ If the rags are kept dry and properly warehoused, they cannot be injurious.

rag-workers from contagious diseases is not to be lightly set aside.

2. Pernicious influences might doubtless result from decay of the animal and vegetable constituents of rags, But, as the rags would be materially injured by decay, it is seldom or never permitted to occur.

In England, France and Holland, it was formerly the custom to place wet rags in tubs; and after being allowed to ferment for fourteen days they were bruised and hammered into pulp. Great improvements in machinery have now rendered this preparation unnecessary.

As the most refuse rags are again in demand, and as the fibre of all rags is injured by continued exposure to moisture, the stores are invariably kept dry. In paper-mills the rags are now reduced to pulp, not by maceration, but entirely by mechanical means; and, if any injurious emanations are given off, the chlorine from the bleaching troughs may have a salutary influence.

3. In the preparation of rags it is always necessary to remove great quantities of dust. For this purpose the rags are enclosed in a large wire-cloth cylinder, to the axle of which a number of spokes are fixed transversely. The cylinder is then made to revolve with some velocity. The spokes prevent the rags from remaining in a mass; and the dirt, sand, and dust escape in large quantities through the wire-cloth. That this dust proves in the long run injurious to health, seems not to be disputed.

In many other trades it is known that injury is sustained by those who during their labour necessarily inhale an atmosphere more or less loaded with irritating matter.*

The injurious effects of dust to workers in flax were long ago recorded by Ramazzini :—"Pulvis enim teter ac noxius ex hac materiâ evolat, ut per os fauces, pulmones subiens, operarios ad continuam tussim compellat, ac ad asthmaticam passionem sensim deducat. . . Colore faciei pallido, tussiculos, asthmaticosos ac lippos."†

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* Among such may be mentioned—millers, maltsters, snuff-makers, flock-dressers, feather-dressers, golf-ball makers, 'shoddy'-grinders, weavers of coverlets, preparers of hair, hatters, 'grounders' of Spanish leather, workers in flax, dressers of hemp, ware-grinders, dressers of japanned goods, masons, colliers, miners of lead (who are injured by working ore in sandstone, but suffer little inconvenience from working ore in limestone), fork-grinders, needle-pointers, file cutters, those employed in turning and draw-filing cast iron, and the makers of fire-arms who are employed in grinding the barrels of muskets and fowling-pieces.

† Ramazzini, De Morbis Artificum, 1717.

Mr. Thackrah has very fully investigated this subject; and, as the dust in flax-mills does not materially differ from that given off during the preparation of rags, we venture to quote from his remarks. "Dressers of flax," he says, "and persons in the dusty rooms of the mills are generally unhealthy. They are subject to indigestion, morning vomiting, chronic inflammation of the bronchial membrane, inflammation of the lungs, and pulmonary consumption. The dust, largely inhaled in respiration, irritates the air-tubes, produces at length organic disease of the bronchial membrane or of the lungs themselves, and often excites the development of tubercles in persons predisposed to consumption.

The first effects, however, do not appear to be direct. The operatives suffer not so much on entering the mill as on leaving it at night. They become particularly susceptible to atmospheric vicissitudes. Besides its application to the air-tubes, dust, we have little doubt, is swallowed with the saliva, and deranges in a greater or less degree the functions of the stomach.

The early stage of the malady which attacks flax-men varies from that of ordinary bronchitis. The cough and difficulty of breathing are not contemporary; one precedes the other, sometimes by months, more frequently by years. The cough is harsh; its invasion is generally confined to the morning and evening."*

We have lately had under medical treatment the foreman of a flax-mill near Lille, in the north of France. This patient suffers from chronic pulmonary catarrh, which he attributes to having worked all his life among flax. The information he has afforded us as to the health of his work-people is in great part confirmatory of Mr. Thackrah's statements.

All the evidence we have been able to collect, certainly goes to prove that rag-collectors suffer from the same affections, only in a less degree. They probably inhale the irritating dust less largely and less continuously than workers in flax do. But the question is only one of quantity and of time.

Various protective appliances have been suggested for their benefit; but, as in analogous cases, such appliances are almost never used. It is evident that none, if possible, should be employed as rag-sorters, who show any tendency to scrofulous disease.

In conclusion, we may remark that the whole inquiry is

* The Effects of Arts, Trades, and Professions, on Health and Longevity. By C. Turner Thackrah, Esq. 2nd ed. 1832. pp. 71-2.

evidently beset with fallacies. The consideration of the effects of working among rags may be interesting, and likely to lead to important deductions; but the materials of which we are in possession cannot be considered exhaustive. For, in order to ascertain with precision to what degree any trade is injurious to health, it would be necessary to ascertain the whole number of persons engaged in that trade, the total number of deaths from each disease which occurred among them, and also the results compared with the aggregate mortality of the population in the districts where such trade is carried on. "Possessed of such data upon a sufficiently extensive scale, we might arrive at accurate conclusions respecting the influence of occupation in the production of disease; and having established the aggregate effect of the circumstances connected with the exercise of any particular trade, we might, by a careful study of all such circumstances taken separately, refer each to its proper place in the scale of causes, and determine its positive effect. Researches of this kind, if carefully conducted, could not fail to lead to valuable practical results, by showing what alteration of circumstances might render any particular trade more salubrious."*

Unfortunately, however, the materials for such calculations do not exist.

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* A Treatise on Pulmonary Consumption. By Sir James Clark, M.D., F.R.S., 1835, p. 187.

## FEVER AND DIARRHŒA FROM FOUL WATER.

By W. I. COX, M.R.C.S., etc.

In the October number of this Review, I spoke at large of the obvious and proven connection of epidemic maladies with the use of foul water and the neglect of proper sewage. Since the writing of the remarks alluded to, cases have occurred in the vicinity of my residence, offering additional and striking illustration of the facts I then brought forward. These I will briefly relate.

I must premise by stating that, with the exception of those about to be mentioned, no cases of diarrhœa or fever have occurred in my district during the last half year. The village wherein I live has remained quite free from those maladies up to the present time. About a mile from the village is a piece of waste-land (common) on which stand ten or twelve houses; and these, with one exception, have no water-supply, save that obtained from surface-pools. Owing to the unusual dryness of the past season, even this source had become less available and more loathsome than wont. Several cases of very severe diarrhœa occurred, among the people inhabiting these houses, in the beginning of September; the children especially were violently affected. On the 20th of that month, two adults, inhabiting the house mentioned above as forming an exception in favour of water-supply, were suddenly attacked with symptoms so nearly approaching to those characterising Asiatic cholera, that, had that epidemic prevailed at the time, I should, unhesitatingly, have set them down as cholera cases. In one case, especially that of Mrs. C., the mistress of the house, a strong healthy woman of 30 years of age, there were rice-water purging, excessive vomiting, sunken features, absolute failure of the pulse at the wrists for ten hours, coldness and lividity of extremities, and croaking voice. The other patient, the husband's mother, was also in a state of severe collapse for some time. Both ultimately recovered with the adoption of energetic treatment. Two children were also attacked in the same house a few days afterwards, but their symptoms were not of so alarming a character. On inquiry, I found that the well on the premises from which they obtained the water for domestic purposes had, about a month previous to this outbreak, become unavailable through some accident, and they had been compelled to use for the house water obtained from a filthy pool at some distance. I examined some of this water. It was so charged with organic decomposing matters (evidently from

contamination with soil-drainings,) that the presence of hydrosulphuret of ammonia was readily shown in it by the usual simple tests. It seems necessary to add that the family were by no means poor, but of cleanly, well-ordered habits, and healthy constitutions.

In a village, situate about two miles from that wherein I live, has lately occurred a case of *continued fever*, terminating fatally from ulceration of the intestinal glands, and which seems to me to have arisen indubitably from sewer emanation, and from no other source whatever. The victim was a young man about 30 years of age, previously in good health, although of a weak constitution. He had employed himself in cleaning out a cesspool at the back of his premises about five weeks before the onset of his malady. At the time of his doing so he felt sick, and, as he expressed it, "dull and head-achy," which sensations never wore entirely off until the characteristic rigors and sleeplessness commenced. No other case of fever has occurred in the village or neighbourhood for the past nine months. On the other hand, the poor man in question had not visited any spot at a distance where fever was prevalent. Indeed, his family assured me that he had not been out of the village for some months previously. Now in this case, was not the fever poison generated from the cesspool emanations? It seems to me quite impossible to come to any other conclusion, or to regard the matter in any other light than as direct cause and effect. Neither, in fact, of the instances I have given can be esteemed as mere fortuitous coincidences.

I am sure I need not apologise for again, and so soon, trespassing on the columns of this REVIEW with regard to such matters. It seems to me important for medical observers to record every mite of positive fact and true logical deduction bearing on these important subjects.

Hawkesbury Upton, Gloucestershire,
November 1858.

# SANITARY AND SOCIAL SCIENCE.

## REPORTS OF CITIES, TOWNS, AND DISTRICTS.

### SANITARY CONDITION OF BOMBAY.

"Our knowledge of the real sanitary state of Bombay is vague and unsatisfactory. It is quite true that we have weekly, monthly, and annual mortuary reports, of the most elaborate kind, but these at present do little more than tell us of the fluctuations in the *mortality* of the people. They give us no means of comparison with any other place, simply because we have no correct knowledge of the population. In fact, only a short time ago we saw in the *Bombay Gazette* an attempt made to estimate the population, from data that must ever be looked upon as a compound of error. Speaking of the mortuary return for 1857, the writer says:—

"'It will be seen that the total number of deaths from all causes amounted to 18,162, against 15,069 in the preceding year, being an increase of 3,093, or about twenty per cent. The increase of mortality is shown to be amongst all classes of the community, arising as well from natural causes as from epidemical disease. Owing to the undefined estimates generally formed of the population of this place, it is next to impossible to calculate with anything like certainty the rates of mortality here as compared with other places. It is shown by the calculations and returns of the Registrar General, that in England nine persons and a half in every thousand die annually. Supposing that to be the rate of mortality in Bombay, the population would amount to 1,901,294; but calculating the deaths at thirty per thousand, or three per cent., the population would number 605,400, which may perhaps be some approximation to the truth. For a town like this, situated in a tropical climate, badly drained, imperfectly cleansed, and the houses generally without proper ventilation, the public health does not appear to suffer so much as might be anticipated.'

"In the first place, we should like to see *where* the Registrar General's calculations and returns show a mortality in England of nine and a half per thousand. In such a case the span of life in England, instead of averaging about forty years, would be far above seventy, and we know that no-one supposes it is so high as that.

"For Calcutta we find the following statistics in the *Friend of India* of 1st July, 1858:—

"'According to the last Conservancy report, the number of deaths during the past year in Calcutta was 18,504 persons. Of

these 883 were Christians, 13,266 Hindoos, and 4,425 Mahomedans. The Commissioners state that of the European inhabitants 6·20 per cent. die every year, of the Hindoos 4·83, and of the Mahomedans 3·99. The *Hindoo Patriot* remarks on this immense discrepancy between European and Native mortality, and accounts for it by the fact that Natives when ill or old leave Calcutta and go to the Upper Provinces. There is another disturbing cause —one-third of the Hindoos and Mahomedans in Calcutta are unmarried, and the returns therefore do not include many children.'

"Calculating from these data, we may express the population of Calcutta as 399,801, and the average mortality for last year as 4·62 per cent. This is in round numbers about double the average mortality in England (2·27), and France (2·5), and we believe that the mortality in Bombay will, when we have data to calculate it, be found to be not very much below that of Calcutta, supposing that we have then a more trustworthy guide to the population of Bombay than that suggested by the Chief Commissioner of Police. We must put aside his last few lines of deductions in reference to the public health not suffering 'so much as might be anticipated' as founded on premises altogether erroneous, and thus not entitled to consideration.

"We know from the mortuary returns that the average number of deaths in Bombay during the last nine years has been 15,023 per annum, and we find that during the past year the number has increased to 18,162; we know that the mortality among sepoys in Bombay is 24·66 per thousand—more than double that (11·9) of the Native Army of the Bombay Presidency generally; we know from actuarial returns of the value of human life that this mortality among the sepoys occurs at ages in which the expectation of life is favourable: we know that the average duration of life in Bombay varies from 23·5 years to 23·7 years; and considering these *facts* can we for one moment believe that 'the public health does not appear to suffer so much as might be anticipated?' We are not now dealing with one supposition—we quote or mention the sources from which we have derived our data, and we believe the facts will startle most men, as much as they did ourselves on completing our calculations. Indeed we find that in the only long calculation into which we feared error might have crept, our results are borne out by Dr. Leith's, that the average duration of life in Bombay is 23·5 years.

"We might enlarge upon the state of the population of Bombay to be taken into consideration with reference to the average age, viz.: that the immigration to it is very great, and that the greatest number of immigrants have passed the most fatal period of life. What the *Hindoo Patriot* alleges as to the proportion of unmarried in Calcutta, we may also surmise in an increased ratio with respect to Bombay, for we find that the births in Bombay are only about half the deaths. We insert a calculation of the different average ages of the deceased of the various castes in Bombay:—

| | | | |
|---|---|---|---|
| Buddhists and Jains | 25·3 | years. | |
| Brahmins | 27·9 | „ | |
| Lingaets and Bhateeas | 25·9 | „ | |
| Hindoos of other castes | 20·77 | „ | |
| Hindoo Outcastes | 21·09 | „ | |
| Mussulmans | 27·45 | „ | |
| Parsees | 30·40 | „ | |
| Jews | 36·10 | „ | |
| Native Christians | 30·59 | „ | |
| Indo-Europeans | 20·60 | „ | |
| Europeans | 26·80 | „ | |
| Negro Africans | 27·0 | „ | |
| Unknown | 17·0 | „ | average 23·7 |

"We are quite aware that this one year's table is of comparatively little statistical value, but it would be most useful to continue it for a period of ten years. The series of tables would then have not only a sanitary value, but also it would be a not unimportant contribution to Physiology.

"So much for our present statistics of population. We require an accurate census of Bombay, and of the various districts into which it is divided. We should wish also a street census. If we had these, and a repetition of the census four or five years hence, we should be able at once to construct maps shaded roughly, which would show at a glance the sanitary state, and the relation between overcrowding and mortality.

"The annual Mortuary Reports of Bombay furnish us with as full particulars of the deaths as we can expect at the present time. We must remember how few are the qualified practitioners of medicine, especially among the classes who furnish the greatest numbers of deaths. In 1856 we find that—

| | | |
|---|---|---|
| 2,151 | persons died from | Cholera |
| 199 | ditto | Small-pox |
| 6,397 | ditto | Fever |
| 8,747 | | |

"We have omitted all the deaths from fever in which any complication or accompanying disease is named. We presume that the fever here named is of the intermittent type, though fever intermittent is afterwards credited with only two deaths. We are quite aware how difficult it is to learn the true cause of death from natives, but it does seem to us that the complications afterwards separately mentioned might be classed under the head of the disease that produced death. But we also find that distinctions apparently without a difference have crept in. Of this kind are 'Fever and Cough,' and 'Fever and Respiratory Disease,' again, 'Fever and Bowel Complaint,' and 'Fever and Diarrhœa.' We think that any medical man would be puzzled to assign distinctive characters to such complications as those above named. The returns are most voluminous, and evidence how much care and labour must have been bestowed upon materials that at the present time are not altogether trustworthy.

"The Report at the commencement of each year's return is most

valuable, and gives the comparative mortality in different parts of the island as well as can be expected so long as we are without the much-to-be-desired census.

"The deaths from fever, cholera, and smallpox, and many of the diseases of the alimentary canal, must be looked upon as preventable, and this amount is far more than sufficient to make us deem any expense slight that shall reduce their frightful number. What is the estimated value of *mere* HUMAN LIFE? We are persuaded that none can answer this in a manner that would be deemed satisfactory by a dispassionate observer; but we think that if we simply state that on the most eminent authority several thousands of lives are *unnecessarily* sacrificed in Bombay by the demon of pestilence, we must effectually arouse attention to the subject. We know, however, that the subject in all its importance has received the careful attention of Government, and believe it is mainly a want of knowledge as to the necessary remedies that is now the stumbling-block to sanitary measures. We have already mentioned the care which is bestowed on sanitary measures by the two nations most advanced in civilisation in Europe, and recent Acts of the Legislative Council of India lead us to hope that a *measure* at least of the same care will be bestowed upon India. We believe that the first Sanitary Commissioner was appointed in Lucknow at the commencement of the memorable siege; what good he did, though crippled by want of labourers, we learn from the mention of his name in the narrative of the siege by General Inglis, and the occasional mention, though grudging and sarcastic, by Mr. Rees. We trust that we shall at some future period have his narrative of sanitary work, and also a history of the medical aspect of the 'Residency,' from first to last. We are sure that something of importance might be gained to sanitary science by such accounts.

"We find that besides the Government of Bombay, the more enlightened among the inhabitants are taking an increasing interest in questions relative to health. A petition, dated 21st May, to the Bench of Justices from a portion of the native community, shows that some at least are awakening to their true interests. The petitioners point out most serious defects in the administration of the Conservancy Act of 1856, and they state broadly that a large amount of bribery goes on amongst the inferior officers of the department in whose hands the cleansing of Bombay is placed. Upwards of six months ago we were told that such bribery as is described in the petition was common, more especially in respect to the dealing out of summonses to the police office for permitting accumulations of filth. We had no means of verifying those statements, but now that they have been publicly brought to the notice of the Justices of the Peace, we have no hesitation in alluding to them, and saying how firmly we believe that all are quite true. From the tenor of this petition we gather that at least a portion of the more influential members of the native community

are convinced that the strict enforcement of this Act is really for their own good.

"We shall dismiss our next topic, water supply, with a very few words. We hope much from the spirit in which the Vehar Water Works are carried out, and that it is only the commencement of an entirely new state of matters in Bombay. Pipes carrying water should be introduced into every house in the densely populated parts of Bombay. Through the agency of this water supply and a new system of drainage, we hope at no distant day to see a greatly diminished number of deaths figuring in the mortuary returns, and consequently a more healthy town.

"At the present time the drainage of Bombay, both as respects the ordinary house drainage and the monsoon water, is as defective as can be. Even close to the most public roads we see vile attempts at drainage, that would disgrace a nation just emerging from barbarism. As an instance of this, the drain between Bellasis-road and the Dhurrumsala is sufficiently public to be more or less under the eyes of all. We shall describe what we saw going on for several months during the past year. That side of the Dhurrumsala fronting Bellasis-road has several small openings in it to permit sewage to pass to the monsoon water-way. Only one of these apertures is used as a drain, but immediately outside of this, as there is no artificial channel for the escape of the sewage to the water-way, a natural cesspool has of course formed. This is from six to eight feet in diameter, and consists of black filth exhaling a most noisome smell. After passing through this cesspool, the fluid formerly pursued a zigzag course until it was all absorbed by the ground in the driest weather, or a small portion might reach the main drain. Some months ago workmen were seen at this place, and we did think that some efforts were being made to do away with the nuisance. We watched the proceedings of these men with some curiosity, and we found that the plan adopted was something like the following. The workmen took earth from the sides of the channel, and *with great care* covered up the nasty looking cesspool, and the stream from it. This was allowed to dry (the supply in the meantime being stopped), and then a straight trench was dug in the place of the former little zigzag. This was judged sufficient, but of course as soon as the supply of sewage recommenced to flow, the cesspool and drain returned to their former state. The mode of cleansing this open ditch was quite as primitive and effectual as the plan of repairing it. Occasionally early in the morning sweepers came and passed their brooms along the bottom of the ditch, until a supply of the black stuff was accumulated. This they took out and placed alongside the ditch to dry in the sun! We have seen the cleansing process repeated several times. We know not whose special duty it was to see after this ditch, but comment is needless. We have not exaggerated one iota. It may to some seem trifling to state a matter so unimportant, but a feather shows the direction of the

wind, and this little trifling fact spoke volumes as to the system which allowed such a plan to be carried into execution.

"The drains, in the more densely crowded part of Bombay, are the worst that can be imagined—broad and uneven at their base, they usually course along immediately alongside the foundations of the houses, and stagnant pools of water are constantly met with. In every part the drains are far too large for the amount of fluid which they have to carry, hence of necessity the deposition of any matter that may be held in suspension takes place, the drain becomes blocked up, and the nuisance is occasioned. How can it be expected that houses should be healthy with their foundations saturated with sewage water, or with the constant exhalations from matter decomposing under the influence of a tropical sun? In some parts of Bombay we find drains made of chunam, open, of a square form, and occasional efforts made to keep them clean. These are attempts at improvement, but are faulty as to material and form, and in being uncovered. The material is faulty, for it is absorbent; the form is bad, for it is calculated to favour deposition; and not having any covering to keep in the gases, and to prevent the sun's rays acting upon both the fluid and solid portions, allows noxious gases to spread disease. If the chunam drains are thus spoken of, how can we characterise the gullies which separate many of the better native houses in the principal streets of Bombay? Let any mere superficial observer cast his eye on either side of the Kalbadavie-road, and glance at the gullies between the houses there, he will then get a clear notion of the filthy state of these apologies for drainage. The windows open into the upper part of these gullies, and we may easily imagine to what kind of atmosphere these windows will give entrance. The street doors of many of these gullies are with great prudence kept locked, but we venture to say that unless the state of affairs has vastly changed for the better within the last three months, any looker-on would see nothing in the open gullies except *degrees* of filth.

"If the real observer leaves his carriage and penetrates into the back streets, the degree of filth gets worse as he proceeds. We confess that in several of our peregrinations we were perfectly convinced that in some places the abortive attempts at drainage had done far more harm than good. The filth was quite stagnant, and being constantly kept moist by accessions of fluid matter, gave out the most disgusting effluvia; it seemed to us that it was only the constant residence in such an asmosphere that could render it endurable. Some months ago, an engineer of high standing remarked to us on some of the houses occupied by employés of Government in the Fort, that he was surprised, not at the men being sick, *but that they could live at all.*

"The main drain of Bombay, like the Fleet Ditch, has proved quite a failure, and we must, we conceive, put it down as irremediable. The old plan of drainage by cesspools can now only be mentioned to be scouted.

"Enough has been said to arouse men who wish to benefit their fellow-creatures. We believe that the evils which we have enumerated are remediable, or we had not thus laid bare some little of what we have seen of the back *slums* of Bombay. We know that the remedy (glazed tile drainage) has difficulties, but none so great as might not easily be surmounted by the engineers of an age that can make railways up the Bhore Ghaut, and carry railways in bridges across the Menai Straits.

"It is quite true that the drainage of London is at present an unsolved problem, but the difficulties that we meet with in London are three principally. 1st. The desire to keep the Thames unpolluted; 2nd. The distance of any other outlet for the sewage; and 3rd. The desire to utilise the sewage of London. Not one of these difficulties meet us in attempting the drainage of Bombay, the sea on almost every side does away with the first and second named, and the third named would surely excite a laugh if any one considered it as an objection to using the sea.

"For Bombay we believe it to be essentially necessary that there should be a foul water drainage system and a simple water drainage system. How far these may be combined, practical engineers must determine; it is essentially necessary to health that both foul and simple water be removed.

"At the present time we believe there is no survey of Bombay sufficiently accurate for the purpose of planning a complete system of drainage. Such a survey is urgently needed. For the perfect drainage of Bombay, several districts should have separate drainage systems, and each be discharged into the most appropriate and convenient part of the sea, beyond low water mark. It is probable that only a part of the town would require to be drained by the lifting system, but whether that part be small or great, or even the whole, we consider that a perfect system of drainage is absolutely necessary.

"As yet we have only spoken of the foul water drainage; simple water drainage is also indispensable to lessen the mortality which results from that tropical plague, intermittent fever. Not one patch of marshy ground should be left to generate the hitherto imponderable miasm only recognised by its effects. Marshes formed by simple water produce intermittent fever and its congeners, and by repeated attacks of these induce debility and organic disease. Want of drainage of foul water and filth, localise and spread epidemic diseases, and cause in the inhabitants who live near them a proclivity to epidemic diseases and general adynamic state of constitution, or in more familiar terms, a state of health below par.

"We have shown what plan is, we believe, required for the perfect drainage of Bombay. Even with great activity among the 'powers that be,' it would be years before any such comprehensive scheme as we have advocated could be carried out; but it must not be for one moment supposed that for the present we should be

less active in making Bombay as clean as present circumstances admit. We should fine rigorously every householder whose drain or gully is not kept clean, and moreover we should make every householder responsible for the portion of street immediately in front of his premises being in a proper state. Let it be seen that it is the householder who is responsible for these matters, and in time *he* will take care that those, whose duty it is to keep the gullies, drains, and streets clean, at least do their work in such a way that he shall not be required at the police office.

"In every quarter of Bombay, public latrines should be established, and fitted with modifications of the apparatus recommended by the Board of Health. Public washing places for the dhobees should also be established, on such a plan that no difficulty may be found in conveying away the soiled water to the drains. With an abundant supply of water and good drainage, proper bathing places in the different sections of Bombay might be supplied at a very small cost.

"With the subject of drainage, we include several of the trades injurious to health which are carried on in Bombay. The most objectionable of these are the places where animals are kept, tanneries, slaughter and dyeing houses. Of the first named of these, the places appropriated to cows and bullocks are usually in a most filthy state, and must be regarded as detrimental to the public health. At every period of the year they are more or less of a nuisance, usually mere sheds, unpaved, and the liquid and solid manure are allowed to spread over the adjacent ground just as the laws of gravitation and absorption dictate, without assistance or guidance from man. The effluvia exhaled are constant, but during and after the monsoon much of the ground around these places become lakes of black liquid filth, which must exercise a most pernicious influence on the health of all living within the circle of their influence. We should like to see the opinion of the medical officers of a large native hospital as to the effect of these cow-houses or yards. In densely populated neighbourhoods no milch cattle should be allowed to be kept, as the mere contamination of the air by the breathing of a large number of animals, must have in the close nights of the hot season of Bombay a most baneful influence. Sometimes milch cows and buffaloes are kept immediately beneath dwellings. In addition to all human sanitary considerations, we have no hesitation in stating that the health of animals so placed must suffer, and if the animals themselves are in a bad state, it follows naturally that their milk cannot be of the same nourishing quality as that from healthy kine. We have not the smallest doubt that health and economy would be alike consulted by placing the whole of the milch cattle a short distance from Bombay. The manufacture of *fuel* should be strictly prohibited.

"The same remarks apply as forcibly to the places used as stables for the hack horses and bullocks of Bombay. Nowhere are

thorough drainage and ventilation more urgently needed than in these miscalled stables. They are constantly placed on the ground floor of houses, and are not unfrequently only open at one end, one wall being deficient for light, air, ventilation, and every other purpose. Attempts are made at drainage in some of these places, but these are made with the worst form of drains, and they are constantly choked up.

"Many of the tanyards are in a dirty state, and all require drainage. The places where the skins are cleaned, and the hair removed, should be paved. A good supply of water is necessary.

"All indigo dye-houses should be placed at a considerable distance from dwelling houses.

"The proprietors of the slaughter-houses, in the present state of the drainage, should not allow the blood and other fluid offal to flow into the drains. Blood and other animal matter, in imperfect drains, tend to clog them up and to give off a large quantity of most offensive gas. They should be well supplied with water, and the utmost cleanliness should be insisted on. Lime-washing the walls every three months should be imperative.

"Of deficient house ventilation in Bombay as a cause of disease, we have little knowledge. As a general rule, we believe that it does not obtain to so frightful an extent as is met with in the poorer portions of towns in temperate climates. This is doubtless owing to the external temperature being so high, and thus it does not require to be excluded. The attention of the authorities in Bombay is, we think, much required to regulate the sheds and dhurrumsalas, where large numbers of itinerant mendicants and others lodge. These places are generally in a most unsatisfactory state, and though we have no means of verifying our supposition, we firmly believe that epidemic disease is not unfrequently rife among those who use them, and that these lodging-places serve as foci whence these diseases originate, or where at least they become localised.

"We note with great satisfaction the proposal lately made to provide European workmen with more suitable abodes, and we would ask, are there no rich natives with sufficient appreciation of the subject of proper habitations for the labouring poor of Bombay to expend a few thousands of rupees in providing, at different parts of the island, model houses, well supplied with water and drainage, and built on the most approved and economic plan, to show to the poor how much it is for their advantage in every way to live in well-arranged buildings? We believe that a few such sets of houses scattered here and there would do far more than years of other instruction to remodel the houses that are now dirty, ill-constructed, and unhealthy. To dignify this work, we would tell them that Prince Albert some years ago devoted much attention to this subject, and did much good. We are sure that there are numbers of scientific and practical men among the Engineers and Medicos who would gladly give their assistance. We know also

that there are some natives of more enlightenment than their fellows who would point out what are the necessities for native dwellings of the class to which allusion is made.

"It was not originally our intention to discuss even cursorily any disease, or class of diseases, for we believe that the public perceive that certain diseases are preventable, but the recent epidemic of small-pox, and the discussions that have taken place in respect to the prophylactic power of vaccination, induce us to make a few remarks on small-pox. We consider the prophylactic power of vaccination as effectual in India as it is in European countries. We have seen two epidemics of small-pox in India, and cases occurring sporadically; we had a considerable number of cases to treat in the epidemics referred to, and we have seen more cases of small-pox occur in the same subject for the second time, than among those who bear the mark of successful vaccination. We have not treated a single case bearing the vaccine mark which was not markedly modified, and passed through the disease without any dangerous symptom. Doubtless the protective power of vaccination, as well as that of an attack of small-pox itself, wears out, and leaves the individual more or less amenable to a fresh attack. This is evidenced by the induction of the vaccine disease several times during the ordinary period of life. The same is true of an individual who has passed through an attack of small-pox,—he may in after years have a second, and some cases have been stated to have had a third attack.

"We repeat what we have before said, that we believe there is no difference in the protective power of vaccination, where it is properly performed, in Western India and in other countries. We are strongly of opinion that in Bombay the occurrence of epidemics of small-pox may be prevented by proper vaccine measures. Crowded dwellings in unvaccinated neighbourhoods are certain to be decimated by a disease whose contagious and infectious properties are greater than those of any other. We think that the vaccination machinery at present in operation in Bombay is as *inoperative* as it is possible to conceive. Bombay requires a vaccinator full of energy, and who has no other call upon his time. For years it will be no light work, the mere superintendence of vaccination in Bombay, if it is to be done effectually. We shall hereafter consider whether the office of vaccinator might not be placed in connexion with that of an office which we regard as absolutely necessary for Bombay.

"Of extramural interment little need be said. Its necessity has been recognised, and the Municipal authorities have only to see that no step backward is permitted.

"We have gone over, as we proposed, some of the more important defects in the sanitary condition of Bombay, and have treated them as bearing so directly and perniciously on the bodily constitution of those living within their influence. No one can doubt that these defects in sanitary police form the hot-beds in

which the germs of epidemic diseases are located, and disseminated all around, producing as their fruit the deaths which we have designated as preventable. We have remarked upon some of the remedies, but, before going more particularly into the plans which we propose for ameliorating the condition of the state of things described, we must glance for one moment at the subject as bearing on man's superior part—the mind and moral development.

"If we look at this historically, we shall find that attention to sanitary matters proceeds with civilisation, but not with equal pace. Generally in country places cleanliness both of person and habitation is more attended to than in towns, but it is only from the difficulty and expenses that attend them in the latter places; hence epidemics arise to warn the inhabitants that their inattention to these matters is reacting. But in what parts of towns do epidemics arise, and from whence spread around?—In the most crowded, demoralised, poorest, and most ignorant quarters. Filth usually goes hand-in-hand with vice. Macaulay's graphic pages on the state of London in the time of the Stuarts illustrate this forcibly. Who that has visited much among the poor living in the purlieus of any large town in Great Britain has not the same experience to tell? It were needless and useless to attempt to settle, in such a case, which is the cause and which the effect, but that they are companions is as certain as possible. We believe that morality and cleanliness react on each other. What can be more demoralising than to live in a crowded part of a city whose atmosphere is tainted with foul emanations? What more depressing to the human mind than to see death from epidemic diseases decimating the people at your own door?

"We have not the least doubt that a well-arranged system of sanitary measures will materially assist the cause of education in Bombay.

"The appointment of a paid municipal council is a step in the right direction. We trust that the council will give a considerable amount of attention to the sanitary concerns of Bombay, but if it is anticipated that, among multifarious municipal concerns, the councillors will have time to attend personally to sanitary matters, we opine that such expectations will be grievously disappointed. It is possible that medical men may, among others, be chosen to sit at this Municipal Board, but sanitary legislation will only be one among many duties that the council will have to fulfil. It can hardly be expected with any show of reason that the councillors, or even one of their number, will be able to do anything in the way of an executive officer; and for real sanitary purposes we want men to see with their own eyes, hear with their own ears, and form their own judgments. We want men qualified by previous education and research to see what is required. We believe that men of sound common sense and business habits are the persons best fitted to be useful as Municipal Commissioners; they must at the same time have enlarged views, but above all decision and purpose

of character. We should not wish to see men sitting at the Council Board who would on any occasion require one of King Alfred's 'Missi.' We cannot *as yet* look upon the Municipal Council as a great stride. It undoubtedly will take the place of the Board of Conservancy, and be well paid, but how it will do its work remains to be seen. We believe that an officer of public health is specially required: doubtless he should possess all the qualifications that we have enumerated for the councillor, but he must have in addition a knowledge of all that is known at the present day with respect to sanitary reform. He should be well paid,—his duties will be both very heavy and very responsible. His powers should be large. If only one officer of health is appointed, far more care should be lavished in the selection, and it would be necessary to entrust him with more power than if a board of health were to be established. The selection of a medical man for this appointment would be difficult, and a still greater difficulty arises as to the power with whom the appointment should rest. We should be very sorry to see one iota of personal interest entering into the selection. We have said that the salary should be large, we now say more,—that it should be sufficiently large to induce a man of some note and promise in the department to leave England and accept it.

"We have insisted on the necessity of a medical officer as Superintendent of Health in Bombay; we believe that one, however energetic, will be found totally unable to do the work. From the first we would suggest that he have two selected graduates of the Grant College as his assistants.

"The Officer of Health should be furnished with weekly reports by every medical practitioner, as to the deaths and sickness in each quarter of the town. This return should in the times of epidemics be furnished daily, and there would thus be a chance of combating the foe on the most favourable terms. The Registrar of Deaths and the Police authorities should also communicate constantly all particulars obtained with reference to disease and mortality that come to their knowledge. Each specified unhealthy locality should be visited as early as possible, and the Officer of Health should then and there endeavour to trace the origin of the disease, and if its cause is removable, an emergent requisition should at once be forwarded to the Superintendent of Repairs or other officer to be appointed by the Municipal Board. This "emergent requisition" at once raises the question, Is any requisition of the Officer of Health to be carried out without the sanction of the Municipal Council? If it is not, and the council sits but once a week, we may expect little good in the cutting short of epidemics by any sanitary means. It will be only a roundabout way of doing business if every requisition requires sanction. If the councillors take time for consideration, they may be much pressed with work, or the emergent requisition only coming before them in due routine, the hour for useful action will have passed

in all probability, and little in the way of good be done. Our own belief is, that in such emergent matters, the requisition should be obligatory on the proper executive officer, and if he delay one hour unnecessarily, on his head be the responsibility. It is on such grounds as these that we have advocated the appointment of a sanitary officer of high standing. He must be not only a theoretic sanitarian, but also a practical one, and one who is willing and able to take responsibility; he ought to be in constant communication with the Municipal Council, and doubtless he will constantly consult and be consulted on sanitary matters. We are sure that an Officer of Health would have every support from the Magistrates, and summonses to the Police Office from him would do away with such a petition to the Bench of Justices as that we have commented on.

"We have before alluded to the connection that might be formed between the sanitary and vaccination offices. We believe that the offices might be joined. (We must not be misunderstood as wishing to give a plurality of offices.) Vaccination is essentially a branch of sanitary science, because the sanitary officer will have the places where vaccination is most wanted constantly brought before his eyes at the time when it will be most gratefully received. We believe that both sanitary and vaccination measures must be systematized, and we are not sure that it might not be a good arrangement to have two sanitary superintendents for different districts, to whom the charge of vaccination should also be committed. By this means constant supervision would be exercised over the subordinate vaccinators. No return should be sent in of which a very considerable degree of certainty did not exist. With some such arrangement, energetically carried out, we believe that if another epidemic of small-pox, such as has occurred during the present year in Bombay, did reappear, that it would be the last for many years; and moreover, were the offices united, that in a comparatively short time the vaccinator's staff would become an efficient secondary staff for vaccination purposes.

"In addition to the duties that we have hinted as appertaining to the Superintendent of Health, there is another to which we attach much importance, viz., the instruction of the educated portion of the natives in the general principles of health. Lectures once a week should be given at the Grant Medical College, and these lectures might be made both interesting and instructive to rising Bombay. The importance of the subject is everywhere recognised in Europe, and we feel sure that its importance has only to be pointed out in Bombay to have its full share of recognition."

[From a review entitled "*Sanitary Aspect of Bombay.*"]

## MISCELLANEA.

### PURIFICATION OF THE THAMES.

The subjoined is the substance of a letter addressed by Mr. F. O. Ward to William Coningham, Esq., M.P., and printed by Mr. Coningham for circulation:—

"In the first place I would remind you, that to throw away the ammonia and phosphorus of the London sewage is virtually to throw away bread. Town sewage, which many engineers look upon as refuse to be discharged, I regard as property to be administered. The proper outfall for the London sewage is not this or that point of the river or of the sea, but a suitable tract of land growing exhausting crops. Fifty farms of a thousand acres each might be raised in value, at least ten pounds per acre per annum, by irrigation with the London sewage. This would produce five hundred thousand pounds per annum, equivalent at five per cent. to ten millions of capital. This ought not to be thrown into the sea.

"In the next place I would point out that just as, on the one hand, the sewage proper should be carefully diverted *from* the Thames, just so, on the other hand, should the rainfall be carefully directed *to* the Thames, to aid its scour; which suffers by every drop withdrawn. To divert a rain brook is to mutilate a river. And every extension of an intercepting system having the amputation of tributaries for its object and effect, must progressively impoverish the main stream. So that, were the Thames to be 'purified' on this plan from end to end, it would be pruned of all its branches; and its whole fresh water stream would be diverted into the intercepting tunnels. The tidal estuary would remain, but the *river* would cease to exist. Its channel would be free from sewage no doubt, but it would also be free from water; and the perfection of purity would correspond to the moment of abolition. This is not what we want; we want a river running pure, but also flowing full.

"Hence, it appears that sewage and rainfall, though valuable when separate, the one to fertilize land, the other to scour streams, are rendered worthless by admixture. Each spoils the other—sewage rainfall by pollution—rainfall sewage by dilution. The mixed mass is too vast and variable for economical distribution over fields, too foul and fœtid for advantageous delivery down streams.

"On this point it is worth while to dwell, for it is the key of the problem.

"The London sewage proper consists of the (say) fifty million gallons which the water companies pump daily into the town, enriched with the residuary matter which this water takes up in its passage through the dwellings of the population. The average weight of residuum (excluding moisture), yielded to the sewage

by each man, woman, and child, is two ounces per diem; or, for the two and a half million inhabitants of London, 139 tons per diem, containing, at seventeen per cent., twenty-three tons and a half of nitrogen, equal to twenty-eight tons and a half of ammonia: which ammonia, at sixpence per pound, is worth £1597. The weight of the pipe-water thus enriched—in other words, of the daily sewage proper, is, in round numbers, only 223 thousand tons; about as much as a heavy shower of rain throws down on two thousand acres of land. This small and uniform daily sewage flow would require only a couple of moderate sized sewers (instead of several colossal tunnels), to convey it away; and, if necessary it could be pumped this way or that by steam power, as easily as a lady pours tea into this or that cup at her pleasure.

"Turn now to the rainfall, and consider the contrast it presents, in this respect, to the sewage.

"The rainfall on the London drainage area, taking this at only fifty-nine and a half square miles, and making ample allowance for evaporation and absorption, may yield to the sewage some eighty or ninety million tons annually; a total which may be taken as about equal to the annual total of sewage. If, therefore, the rain drizzled down uniformly all the year through, so as to afford, like the sewage, a regular daily supply, it could be mastered, like sewage, without difficulty. This, however, as we all know, is not the case. The whole of the rain falls on 152 days of the year; and of the annual twenty-four inches, sixteen fall in forty-four days—or two-thirds of the rain in about one one-eighth of the days. On one day in twelve throughout the year the rainfall is to the sewage of London as four and three quarters to one; on a smaller number of days (about ten in each year), the proportion of rainfall to sewage is as nine and a half to one; and on some few occasions annually it is as nineteen to one and upwards. This disproportion is rendered still greater by the fact that the rainfall assigned to each rainday is not really diffused over twenty-four hours of time, but nearly always descends on a fractional portion thereof; so that, for example, seven million tons of rain, equal to more than a month's sewage, sometimes fall on London in a single hour. The mixed streams of rainfall and sewage, liable to be thus suddenly swollen, exceed the capacity of any tunnels that can be built for their diversion from the river; and would overpower any mechanism at our disposal for their distribution upon the soil. The great brook sewers already existing, and the great rain and sewage tunnels which it is proposed to build for their interception, are equally open to this objection—that their current, on rainy days torrential, must needs shrink in dry weather to a slender streamlet, too weak to scour the containing culvert so as to prevent the accumulation of putrescent deposit.

"Reflect now, for a moment, how this fact of accumulation, of stagnancy instead of circulation, changes all the conditions of the problem. The daily dry fœcal discharge from London amounts only, as we have already seen, to 139 tons; a comparatively insig-

nificant quantity if delivered as fast as produced. But instead of taking measures to secure for London this regular diurnal evacuation, we keep, on the most moderate estimate, at least twelve months *excreta* constantly stagnating underground as deposit in the cesspools and sewers. The mass of putridity thus constantly retained in subterranean London actually equals one day's evacuation of the whole population of Europe and Asia, numbering eight hundred millions. The figure is a startling one, and the fact still more so; but a simple calculation proves it true: for the number of the London population, multiplied by 365, gives a product exceeding eight hundred millions.

"Now consider the effect of a sudden rain-storm falling on London, and pouring through these overcharged subterranean receptacles. Suppose it only to sweep into the river nine or ten day's accumulation of filth, to what do you imagine that is equivalent? It is equivalent to the simultaneous discharge into the river Thames of the mass of excrement produced in one day by the entire population of Great Britain, numbering twenty-one millions. And to such eruptions of filth we should still be frequently liable, even if the great tunnels for mixed rainfall and sewage were built. The money loss on every such occasion would be, in ammonia only without reckoning phosphorus, nearly sixteen thousand pounds. Besides, after every such discharge, the tidal river would remain discoloured, and in hot weather, putrescent, for several days. Such would be the operation of the colossal tunnels on which we are invited to lay out millions; such are the evils consequent on the mingling of rainfall with sewage.

"The obvious conclusion is, that the tunnel scheme propounded by the Metropolitan Board of Works, with the sanction of Mr. Stephenson and his party, not merely ignores one half of the problem in hand, viz., the agricultural utilisation of the sewage, but is inadequate to accomplish the moiety which alone it contemplates, viz., the purification of the river.

"Indeed, by their last vote on this subject, the Metropolitan Board resolved to pour the sewage of the western district of London, more or less deodorised, into the Thames above Westminster Bridge, and to reserve the proposed great tunnels for the conveyance of the remaining sewage only. Of deodorisation, the mainstay of this scheme, I will only here remark that, while at best it is a costly and imperfect palliative it becomes quite impracticable precisely when most needed, *i.e.*, when heavy showers are sweeping from the sewers the largest masses of putrescent filth. Independently, however, of this objection, the two parts of the scheme are manifestly inconsistent. For, if deodorisation suffices for the west, why is interception necessary for the east? And, contrariwise, if miles of tunnel are required to convey far off the eastern sewage, how can it be right to pour the western sewage into the river above bridge? Surely the principle must be false that leads to such illogical conclusions.

"The principle to which, by these and other considerations, my friends and I have been gradually led, is shortly this—that *the whole of the rainfall is due to the river, the whole of the sewage to the soil.*

"The adoption of this principle is, we believe, as essential for the perfect purification of the Thames, as it is for the economical utilisation of the sewage.

"That this may be obvious to you, pray keep in view that when sewage and rainfall are once mixed, whether in the Thames itself or in the minutest of the filaments that feed it (in a street-sewer or in a house-drain for example), those mingled waters can never again be separated. In polluting the smallest of its tributaries you virtually pollute the Thames; and, as it has been said, 'Take care of the pence, and the pounds will take care of themselves," so I venture to say, "Purify the tributaries, and the main stream will run pure of itself."

"If, now, we trace in each house the course of the rain from roof and area, and the course of the sewage from closet and sink, till we come to the point at which the separate pipes conveying these two distinct streams meet in a single drain, we arrive at the precise boundary line between possible and impossible in this matter of Thames purification and sewage utilization. For, up to this point, and before this meeting of two waters, we are free to apply each streamlet to its proper use. We can send the unpolluted rainfall to scour the river, and the undiluted sewage to fertilise the land. But directly this junction point is passed, directly the daily runlet of cistern-water, rich with its freight of ammonia and phosphorus, meets and mingles with the casual rainfall, the two waters become, as we have seen, a worthless unmanageable mixture, equally unfit for agricultural and urban use. Not only do they cease to be our property, and pass beyond the control of art, but they revert to the domain of nature, spoiled even for her simple service. For this error we are punished by pestilence.

"I say, therefore, that the battle of Interception is to be fought, not on the banks of the river, but in the basements of the houses; not with monstrous tunnels, but with modest tubes; not by the diversion of variable rain-brooks, alternately dry and torrential, but by the diversion of uniform cistern supplies, always moderate and manageable; not at a profitless cost of many millions, yielding no return, but at a profitable outlay of few millions, producing an ample return,—probably half a million per annum.

"This tubular purification of rivers, and fertilisation of lands, is indeed but the logical extension of the tubular drainage of houses and streets, which my friends and I have succeeded in establishing after a ten years' struggle with the engineers. And as our tubular sewers, notwithstanding the strenuous opposition of Mr. Stephenson and his friends, are now working successfully by hundreds of miles, not only in provincial towns, but in the metropolis itself: so also, I am confident, will the tubular purification

of the Thames ultimately supersede the monstrous tunnel project, which, if adopted, would cost us many millions, and turn out a gigantic failure after all.

"You will observe that, in this short note, I have confined myself to the summary indication of a few broad principles; abstaining purposely from the premature development of a specific plan for their realisation. My name has indeed been attached without my sanction, to plans and calculations which have been widely circulated, ostensibly to illustrate, but really to discredit, the principles which I advocate. It has even been asserted that the realisation of those principles would involve the tearing up of every basement in London, the re-construction in duplicate of the drains from back to front of every house, and from end to end of every street,—with other equally preposterous extravagancies. Such conclusions are not mine, and they argue only poverty of invention on the part of those who can imagine no simpler means of carrying my views into effect.

"I have only to add, in conclusion, that the purification of rivers and the utilisation of sewage are, in my judgment, but two aspects or incidents of a sanitary organisation, comprising several other elements, each indispensable to the perfect working of the whole. This complete organisation cannot, however, be suddenly accomplished; nor can even its several parts be simultaneously prepared. But in the development of such portions as we may be able presently to undertake, the others may be kept in view. And this is in the highest degree desirable, in order that the sanitary works of our day may operate, not as a bar, but as a transition, to the more perfect institutions of our successors. Should the monstrous rain-and-sewage tunnels, proposed by the Metropolitan Board, be built, they would indeed oppose a serious obstacle to such ulterior progress. But of this I have little fear. Those subterranean rivers are already beginning to be regarded by the ratepayers as a costly and colossal blunder; and, unless I am much mistaken, they will be obsolete before they are begun."

We have reprinted the whole of Mr. Ward's letter under the impression that the views it expresses cannot be too strongly enforced. The scheme which he so ably denounces is now (somewhat modified in character, certainly, but not less objectionable) too far arranged to be recalled, but this is no reason why the gigantic blunder about to be carried out should be left uncriticised. We concur with Mr. Ward, that the monstrous error will be discovered before it is finished, but not, we fear, before a few millions of money have been expended on an absurd experiment. [EDITOR.]

# PROGRESS OF EPIDEMICS.

## LOCAL REPORTS OF EPIDEMIC AND ENDEMIC DISEASES

*During the Months of September, October, and November*, 1858.

| Place. | County. | Lat. | Long. | Observer. |
|---|---|---|---|---|
| St.Mary, Scilly | Cornwall - | 49.50 N. | 6.24 W. | J. G. Moyle, Esq. |
| Teignmouth - | Devonshire - | 50.32 N. | 3.29 W. | W. C. Lake, Esq. |
| Portsmouth - | Hampshire - | 40.58 N. | 6. 6 W. | Alfred Jackson, M.D. |
| Odiham - - | Hampshire - | 51. 8 N. | 1. 3 W. | J. McIntyre, M.D. |
| Canterbury - | Kent - - | 51.17 N. | 1. 4 E. | G. Rigden, Esq. |
| Chatham - | Kent - - | 51.21 N. | 0.14 E. | F. J. Brown, M.D. |
| Wandsworth - | Surrey - - | 51.28 N. | 0. 7 W. | G. E. Nicholas, Esq. |
| Putney - - | Surrey - - | 51.28 N. | 0. 8 W. | R. H. Whiteman, Esq. |
| Up. Holloway | Middlesex - | 51.32 N. | 0.03 E. | W. B. Kesteven, Esq. |
| Hawkesbury - | Gloucestersh. | 51.34 N. | 3.20 W. | W. I. Cox, Esq. |
| Swansea - | Glamorgansh. | 51.38 N. | 2.50 W. | W. H. Michael, Esq. |
| Colchester - | Essex - - | 51.54 N. | 0.52 E. | Henry Laver, Esq. |
| Aspley Guise - | Bedfordshire - | 52. 1 N. | 0.37 W. | J. Williams, M.D. |
| Saffron Walden | Essex - - | 52. 3 N. | 0.12 E. | T. Spurgin, Esq.<br>H. Stear, Esq. |
| Bedford - - | Bedfordshire - | 52. 8 N. | 0.51 W. | T. H. Barker, M.D. |
| Newpt.Pagnell | Buckinghams. | 52.10 N. | 0.42 W. | G. O. Rogers, Esq. |
| Sharnbrook - | Bedfordshire - | 52.12 N. | 0.40 W. | R. S. Stedman, Esq. |
| Wellingbro' - | Northamptons. | 52.20 N. | 0.40 W. | B. Dulley, Esq. |
| Beccles - - | Suffolk - - | 52.25 N. | 1.48 E. | W. E. Crowfoot, Esq. |
| Thetford - | Norfolk - - | 52.26 N. | 0.45 E. | H. W. Bailey, Esq. |
| Stourbridge - | Worcestersh. - | 52.28 N. | 2.32 W. | A. Freer, Esq. |
| Dudley - - | Staffordshire - | 52.30 N. | 2.10 W. | J. H. Houghton, Esq. |
| Barrowden - | Rutland - | 52.34 N. | 0.38 W. | H. J. Swann, Esq. |
| Wisbeach - | Cambridgesh. | 52.39 N. | 0. 5 E. | W. H. Hole, Esq. |
| East Dereham | Norfolk - - | 52.40 N. | 0.57 E. | J. Vincent, M.D. |
| Pontesbury - | Shropshire - | 52.43 N. | 2.50 W. | Wm. Eddowes, Esq. |
| Nottingham - | Nottinghamsh. | 52.50 N. | 1.10 W. | T. Robertson, M.D. |
| Burton-on-Trt. | Staffordshire - | 52.53 N. | 1.53 W. | S. Thomson, M.D. |
| Oswestry - | Shropshire - | 52.53 N. | 2.59 W. | P. Cartwright, Esq. |
| Wrexham - | Denbighshire - | 53. 2 N. | 3. 1 W. | E. Williams, M.D. |
| Hawarden - | Flintshire - | 53.11 N. | 3. 2 W. | T. Moffat, M.D. |
| Lincoln - | Lincolnshire - | 53.12 N. | 0. 5 W. | S. Lowe, Esq. |
| Alford - - | Lincolnshire - | 53.15 N. | 0. 6 E. | R. U. West, M.D. |
| Gainsborough | Lincolnshire - | 53.23 N. | 0.47 W. | D. Mackinder, M.D. |
| Liverpool - | Lancashire - | 53.24 N. | 2.59 W. | Thos. Bickerton, Esq. |
| Warrington - | Lancashire - | 53.25 N. | 2.32 W. | C. N. Spinks, Esq. |
| Wigan - - | Lancashire - | 53.32 N. | 2.33 W. | Jephtha Hussey, Esq. |
| Bolton - - | Lancashire - | 53.35 N. | 2.19 W. | W. H. Pendlebury, Esq. |
| York - - | Yorkshire - | 53.58 N. | 1. 3 W. | W. Procter, Esq. |
| Wst. Auckland | Durham - | 54.45 N. | 1.40 W. | G. Todd, Esq. |
| Rothbury - | Northumberld. | 55.25 N. | 1.50 W. | E. C. Summers, Esq. |
| Lerwick - | Shetland Isles | 60. 9 N. | 1. 8 W. | G. W. Spence, M.D. |

## QUARTERLY STATEMENT—No. XVI.

[*The dates denote that the disease appeared in the weeks then ending.*]

SCARLET FEVER.

Teignmouth—Sep. 10-24, all Oct. and Nov.
Portsmouth—Nov. 26 [Nov.
Canterbury—Sep. 3-17
Chatham—Sep. 17, Oct. 8-15, Nov. 12
Wandsworth—Oct. 8, 22-29, all Nov.
Putney—Sep. 3, Oct. 1-8, 29, all Nov.
Up. Holloway—Every week
Hawkesbury Upton—Sep. 10-24, all Oct. & Nov.
Swansea—Every week [

Saffron Walden—Nov. 26
Sharnbrook—Every week
Wellingborough—Every week
Beccles—Sep. 3-24, Oct. 1-15
Thetford—Sep. 3-17, Oct. 22-29, Nov. 12-26
Stourbridge—Sep. 24, Oct. 1-8, 29, Nov. 5-19, 26
Dudley—Sep. 3-10, Oct. 1, 15, 29, Nov. 5, 19-26
Barrowden—Sep. 3-17, Nov. 5-19
Wisbeach—Oct. 22-29, all November
Pontesbury—Every week
Nottingham—Sep. 3, 17-24, Oct. 8, 22, Nov. 5-19
Burton-on-Trent—November 19
Wrexham—September 10-17
Hawarden—November 5
Gainsborough—Sep. 10-24, Oct. 1 8, 29,
Liverpool—Every week [Nov. 5
Wigan—Sep. 10, 24, Oct. 8, 29, Nov.
Bolton-le-Moors—Every week [12-26
York—Sep. 3, 17-24, Oct. 8, 22, all Nov.
Lerwick—Sep. 10

MEASLES.

Teignmouth—Oct. 1-22, Nov. 5, 19-26
Portsmouth—September 17
Canterbury—Every week
Chatham—September 17, October 1
Up. Holloway—November 19-26
Wanstead—November 12
Swansea—All September, Oct. 1-15
Wellingborough—November 12-26
Thetford—October 15
Stourbridge—All Sep. Oct. 1, 15-29,
Wisbeach—All Nov. [Nov. 5-26
Nottingham—Sep. 3, 17, Oct. 22
Alford—All September, October 1
Liverpool—Every week
Wigan—Oct. 1, 15, 29, Nov. 12, 26
Bolton-le-Moors—Every week
York—Sep. 3, 17-24, Oct. 8, 22, all Nov.

SMALL-POX.

St. Mary's, Scilly—November 26
Portsmouth—October 22
Chatham—November 5-12
Up. Holloway—Sep. 24, Oct. 1
Swansea—Oct. 1, 29
Aspley Guise—November 26
Bedford—Oct. 22-29, Nov. 5-12
Dudley—October 29
Barrowden—October 1-8
Nottingham—October 1, Nov. 12, 26
Gainsborough—Every week
Liverpool—Every week
Bolton-le-Moors—Sep. 3-17, Oct. 15-29
Rothbury—October 1 [all Nov.
Lerwick—September 3

HOOPING COUGH.

Teignmouth—Oct. 1-8, 22, Nov. 5, 19
Portsmouth—September 24
Canterbury—September 10
Chatham—September 17, October 1
Putney—October 29, all November
Up. Holloway—September 3
Hawkesbury Upton—Sep. 3-10
Swansea—Sep. 1-10, 29, Oct. 8
Bedford—October 15-29
Beccles—Oct. 22-29, Nov. 5-12
Thetford—October 22
Dudley—November 12
East Dereham—All November
Pontesbury—All September, Oct. 1
Oswestry—Sep. 24, all Oct., all Nov.
Wrexham—Oct. 8-29, all November
Alford—All September, October 1
Gainsborough—All September
Liverpool—Every week
Bolton-le-Moors—Sep. 17-24, Oct. 1, 22-29. Nov. 5-19
York—Sep. 10, Oct. 8-22, all Nov.
Rothbury—September 10-24

CROUP.

Canterbury—November 5
Chatham—October 22
Putney—November 19
Up. Holloway—October 22
Hawkesbury Upton—November 26
Swansea—Sep. 1, 24, October 8
Aspley Guise—September 3-10
Newport Pagnell—Oct. 22, Nov. 26
Beccles—November 12-19
Thetford—September 3
Stourbridge—November 19
East Dereham—October 8
Wrexham—November 5-19
Liverpool—Oct. 22-29, all November
Bolton-le-Moors—Oct. 1-15, Nov. 5-12,
York—Oct. 8-29, Nov. 12 [26

CATARRH.

St. Mary's, Scilly—Oct. 8-29, all Nov.
Teignmouth—Oct. 8-22, Nov. 12-26
Chatham—Sep. 17, October 15-22
Wandsworth—Sep. 10-24, Oct. 1, 15-29,
Putney—Every week [all Nov.
Hawkesbury Upton—Oct. 8-22
Swansea—Oct. 8-29, all November
Aspley Guise—November 12-26
Saffron Walden—November 19-26
Bedford—November 12-19
Newport Pagnell—November 19-26
Sharnbrook—Sep. 10-24, Oct. 8-29, all November
Wellingborough—Oct. 15-29, all Nov.
Beccles—Sep. 24, Oct. 1-22, Nov. 12, 26
Thetford—Sep. 3-10, 24, Oct. 1-22, all
Stourbridge—Oct. 8-29, all Nov. [Nov.
Dudley—Sep. 3-10, 24, Oct. 1-8, 22-29, November 26
Wisbeach—Oct. 22 29, all November

East Dereham—All November
Pontesbury—Oct. 8-29, all November
Nottingham—November 5, 19-26
Burton-on-Trent—Nov. 5-19
Oswestry—Every week
Wrexham—Nov. 12-26
Gainsborough—Oct. 8-29, Nov. 5-19
Liverpool—Every week
Wigan—Oct. 15, Nov. 5, 26 [all Nov.
Bolton-le-Moors—Sep. 3-17, Oct. 15-22,
York—Sep. 17, Oct. 1, 15, 29, Nov. 5, 19-26
Rothbury—November 12-26
Lerwick—Sep. 17, Oct. 15-22, Nov. 12

INFLUENZA.

Teignmouth—Oct. 15, Nov. 12, 26
Chatham—Sep. 17-24, Oct. 1-8, all Nov.
Saffron Walden—Oct. 29, Nov. 19-26
Bedford—Oct. 22-29, Nov. 5-19
Newport Pagnell—Sep. 3-10, Oct. 8-29,
Sharnbrook—Nov. 12-26 [all Nov.
Wellingborough—Nov. 12-26
Beccles—Oct. 29, Nov. 5 [19-26
Thetford—Sep. 10-17, Oct. 8-22, Nov.
Stourbridge—Oct. 15-29, all Nov.
East Dereham—All November
Pontesbury—Oct. 29, Nov. 5-19
Nottingham—Sep. 24, Oct. 8
Oswestry—October 29, all November
Wrexham—Nov. 12-26
Hawarden—All November
Liverpool—All Sep., all Oct., Nov. 5-12
Wigan—October 8
Bolton-le-Moors—All Oct., all Nov.
York—Sep. 3, 17, Oct. 8, 29, Nov. 5-12, 26
Lerwick—Oct. 15-29, Nov. 5-19

ERYSIPELAS.

Teignmouth—November 26
Southsea—Oct. 22, Nov. 19
Canterbury—October 29
Chatham—Sep. 3, 17, Oct. 8, Nov. 12-26
Wandsworth—October 1-8, 22
Putney—September 3, 24, October 1
Wanstead—October 29, Nov. 5-12
Swansea—September 10
Saffron Walden—October 15
Bedford—September 17 [Nov. 12-26
Newport Pagnell—All Sep. Oct. 1, 22,
Wellingborough—Oct. 22-29, Nov. 19-
Beccles—Oct. 8-15, Nov. 26 [26
Stourbridge—Sep. 3, 24, Nov. 19
Dudley—September 17-24, October 1
Barrowden—October 29
Wisbeach—September 17-24, Nov. 12
East Dereham—September 3-10
Pontesbury—Sep. 17-24, Oct. 1, 22-29,
November 19-26
Nottingham—Oct. 1, 22, Nov. 12, 26
Oswestry—All November
Hawarden—Oct. 8-15
Gainsborough—Oct. 8-29, Nov. 19-26
Liverpool—Every week
Wigan—Oct. 22, Nov. 5, 19
Bolton-le-Moors—Sep. 17, Oct. 15, 29,
York—Sep. 17, Oct. 15 [Nov. 5-12
Lerwick—October 29

AGUE.

Southsea—September 17
Canterbury—All Sep., Oct. 8-22
Chatham—October 8-15, Nov. 19-26
Bedford—October 1-8
Wellingborough—All Oct. and Nov.
Beccles—September 17-24, October 1
Thetford—September 3, Nov. 12-26
Nottingham—October 8
Stourbridge—November 26
Barrowden—Sep. 3-10, Oct. 15, Nov. 12
Wisbeach—Sep. 10-24, Oct. 1, 22-29,
East Dereham—Sep. 3-10 [Nov. 12
Liverpool—November 19-26

REMITTENT FEVER.

Teignmouth—Sep. 17, Oct. 29, Nov. 12
Canterbury—September 10, 24
Putney—September 24, November 5
Wanstead—October 8-15
Newport Pagnell—All Sep., Oct. 1-22
Beccles—November 5-19 [19-26
Thetford—All Sep., Oct. 8-15, 26, Nov.
Stourbridge—September 3
Oswestry—September 3-17, Nov. 26
Alford—All September, October 1
Liverpool—Sep. 3-10, Oct. 1, 22, Nov.
Wigan—Oct. 1, 15, Nov. 12 [12-26
Bolton-le-Moors—Every week
York—Sep. 24, Oct. 15, 29

DIARRHŒA.

Teignmouth—Sep. 10-24, all Oct., Nov.
Southsea—Sep. 3, 17, Oct. 1-8 [5-26
Canterbury—All September, Nov. 5-12
Chatham—Sep. 3-10, Oct. 1, 15-29,
November 12-26
Wandsworth—All Sept. & Oct., Nov.
Putney—All Sep. and Oct. [19-26
Hawkesbury Upton—All September
Swansea—All September, October 1
Saffron Walden—Sep. 10-17, Oct. 1,
15-22, November 19-26
Bedford—September 3-10, October 22
Newport Pagnell—Every week
Sharnbrook—Sep. 17, Oct. 1-15, Nov. 5
Wellingborough—All Sept. and Oct.
Beccles—October 1-8, 22
Thetford—Sep. 3-10, 24, Oct. 1, 15-22,
November 5-19
Stourbridge—All Sep., Oct. 1-22
Dudley—Every week
Wisbeach—All Sept. [Nov 5-19
East Dereham—Sep. 3-10, Oct. 22-29,
Pontesbury—All Sep., Oct. 1-8
Nottingham—Sep. 24, Oct. 1, 15-22
November 12-19

Burton-on-Trent—Sep. 10-24, Oct. 29,
Oswestry—Every week [Nov. 5-12
Wrexham—All October & November
Hawarden—Sep. 3-17, Nov. 19-26
Alford—All Sep., Oct. 1, 29, all Nov.
Gainsborough—Every week
Liverpool—Every week
Wigan—Oct. 15, 29
Bolton-le-Moors—Sep. 3-17, Oct. 1-8
York—Sep. 10, Oct. 1, 22, Nov. 5, 19-26
Rothbury—Oct. 8, 29
Lerwick—Sep. 3-10, Nov. 5, 19

DYSENTERY.

Teignmouth—November 12
Chatham—Sept. 10-17 [Nov. 5
Wandsworth—Sept. 3-10, Oct. 8, 22-29,
Wanstead—Sept. 10-24, Oct. 1-8
Swansea—September 10-17
Saffron Walden—Nov. 26 [12
Newport Pagnell—Oct. 15 22, Nov. 5-
Stourbridge—Sep. 3-10, 24, Oct. 1-8,
East Dereham—Sep. 3-10 [Nov. 12
Nottingham—Sept. 10, Oct. 8, 22-29,
Wrexham—All Oct., Nov. 5-12 [Nov. 12
Gainsborough—Sep. 24, Oct. 1-22, 29,
Liverpool—Oct. 1-22, all Nov. [Nov. 5-19
Bolton-le-Moors—Sep. 10, 24, Oct. 1-8, 22-29

TYPHUS.

Portsmouth—Sep. 3-17, all Oct., Nov.
Canterbury—Every week [19
Chatham—Sep. 3-17, Oct. 1-8, 22
Wandsworth—Sep. 3-17, Oct. 8, Nov.
Putney—Sep. 3, 17, Oct. 15 [5, 26
Hawkesbury Upton—October 1
Bedford—All October
Beccles—October 1-22
Thetford—September 24
Dudley—All Sep., Oct. 1-8, 29, Nov. 5,
Wisbeach—All September [26
Pontesbury—Sep. 17-24, all Oct. & Nov.
Nottingham—Sep. 10-17, Oct. 1
Wrexham—Sep. 17-24, Oct. 1-22
Alford—All Sep., Oct. 1
Gainsborough—October 1
Liverpool—Every week [29, all Nov.
Bolton-le-Moors—Sep. 17-24, Oct. 15-

DIPHTHERIA.

Portsmouth—Sep. 17, Oct. 15, Nov. 5,
Canterbury—Oct. 15 [19-26
Wandsworth—November 5
Alford—Every week

PUERPERAL FEVER.

Newport Pagnell—Sep. 24, Oct. 1-15,
Barrowden—Sep. 10 [Nov. 19-26
Nottingham—Sep. 3, 17, Oct. 8-15
Alford—October 15
Wigan—November 5, 19
Bolton-le-Moors—October 15
Lerwick—September 24

TYPHOID FEVER.

Burton-on-Trent—All Sep. and Oct.,
Wigan—Nov. 5-12 [Nov. 5-19

VARICELLA.

Lerwick—September 24, October 8,

GASTRIC FEVER.

Lerwick—October 15

CARBUNCLE.

Canterbury—Sep. 10-17, Oct. 22
Chatham—October 15-22
Putney—September 17-24
Saffron Walden—October 22
Newport Pagnell—Sep. 17-24, Oct. 1
Sharnbrook—Oct. 22, Nov. 12
Wellingborough—October 15-29
Beccles—November 19-26
Thetford—September 17
Stourbridge—October 1-8
East Dereham—September 3-10
Burton-on-Trent—September 10
Oswestry—September 3-17
Gainsborough—September 17-24
Liverpool—November 19-26
Wigan—October 15
Bolton-le-Moors—Oct. 1-15, all Nov.
York—Nov. 5-12, 26
Lerwick—October 15

## ADDITIONAL OBSERVATIONS.

*St. Mary's, Scilly.*—Mr. Moyle says: "The quarter has been, on the whole, healthy; the cases being principally those of epidemic catarrh, which disease continued for thirty-three days, during the prevalence of strong easterly winds in October and November. One case of small-pox was landed from a ship in the last week of November: the disease has not spread as yet. The case is doing well. We have had but few deaths during the quarter: three occurred in aged people; one from phthisis; and one from gangrene of the lung. The

weather has been fine, though breezy throughout the three months. The depth of rain has been 6·1 inches."

*Teignmouth.*—Mr. Lake writes: "Diarrhœa was not nearly so prevalent as it usually is this quarter. Scarlatina was unusually fatal: the cases that occurred were principally among the lower classes. In most cases, the stage of eruption was passed over well; and the fatality arose from exposure to cold bringing on a renal affection, with concomitant dropsy. If the last quarter (June—August) was painfully healthy for the medical man, this was painfully unhealthy to the public and to himself too."

*Canterbury.*—Mr. Rigden says: "During the three months in this report, the epidemic most prevalent in this city has been measles; several cases of which disease have occurred, but only two have terminated fatally. Continued fever has been frequently met with; and eleven cases have ended in death. Ague has been more common than was the case a few years since; but the disease has generally been quickly cured by large doses of quinine administered immediately before the paroxysm. A few cases of scarlet fever were met with in the early part of September; but this disease is not now prevalent. Two cases of croup terminated fatally in the beginning of November in children aged three years, who had been living in the same neighbourhood. Cases of carbuncle are continually presenting themselves. Diphtheria, which was very prevalent in the early part of the year, and even into the middle of summer, appears now to have almost left us; but one death from this disease, a male aged 28, has been registered during the three months now reported on. The register of deaths for this district shows that in the month of September there were 11 deaths from zymotic diseases; viz., 6 from fever, 1 from measles, 2 from scarlet fever, 1 from diarrhœa, and 1 from asthma. In October, three cases; viz., 2 from fever, and 1 from diphtheria. In November, 6 cases, viz., 3 from fever, 1 from measles, and 2 from croup."

*Chatham.*—Dr. Brown states that cases of nephritis have been extremely numerous during the past three months, Ague has ceased to be prevalent.

*Wandsworth.*—Mr. Nicholas writes: "The most prevalent and severe forms of disease during the past quarter have been those affecting the organs of respiration, and scarlatina. In 358 cases of sickness occurring amongst the poor, the former constituted nearly one-sixth, the latter one-eighth, of the whole. At the period of this return, scarlatina is becoming very general; and, although hitherto of mild character, is

assuming a very virulent form of the anginose type. The very varied character in which the disease has presented itself is worthy of remark; in some, slight pyrexia, followed by renal dropsy; in others, slight sore throat with a little febrile disturbance, followed by peeling of the skin; in others, malignant sore throat with abundant gelatiniform exudation, with and without consecutive dropsy, and with and without inflammation of the glands; in one case slight pyrexia and inflamed parotids were the only symptoms (which at any other time I should have named mumps). These varieties, with and without eruption, have occurred, too, under apparently similar circumstances; that is, in different members of the same family in many instances. The sequelæ have been unusually severe; the most common being sloughing of the parotid and cervical glands, and otitis. The tendency to dropsy and the severity of the sequelæ have invariably been inversely as the intensity of the eruption; an effect which might be preconceived from a consideration of the vicarious duties of the skin and kidneys. The indication of treatment, therefore, as regards the circulation, would appear to lie in a carefully sustained diaphoresis."

*Putney.*—Mr. Whiteman says: "Throughout the entire quarter, catarrh has been unusually prevalent. Of the more severe forms of zymotic disease, scarlatina has been the most fatal; but not so much so among the poorer classes as among the classes above them. During the quarter, some cases of low fever, one of which was of a very severe character, occurred in a house situated in a badly drained locality. In the same locality (the property belonging to one of the most stubborn of landlords) cases of diarrhœa were continually coming under treatment in the months of September and October. The water supply to the inhabitants of this neighbourhood is from a well, evidently contaminated by the percolation of soil from a closely approximating cesspool. In the month of September carbuncle showed itself in a very severe form in one or two instances, but the patients, though aged, recovered remarkably well. I have had during the quarter one fatal case of croup in private practice, and in my public practice one of cynanche tonsillaris. The entire absence of small pox, not a single case of which has been treated here for several years past, is a circumstance worthy of record, as well evidencing the prophylactic value of vaccination. As the public vaccinator of the district, I have never depended upon voluntary submission to the operation, but have searched out the unprotected in schools, in public establishments, and

amongst the poor, and hence have been able to bring many under its influence who would otherwise have escaped me. To this practice I attribute, in great measure, the immunity of this parish from varioloid disease."

*Hawkesbury Upton.*—Mr. Cox writes: "Scarlatina has been extensively epidemic during the whole quarter. The type has been generally favourable, as will appear from the fact that of 31 cases under my own care but two deaths occurred. The severer cases were in a highly insalubrious and ill-drained portion of the district. The cases of diarrhœa and fever form the subject of a short paper in another part of the SANITARY REVIEW. There is a great scarcity of water, owing to the unusually small amount of rain that has fallen. The temperature was high for the season until November 9th, when severe frost set in with violent easterly gales, which lasted to the 25th, when a thaw occurred. A few scattered cases of pneumonia and 'red water' occurred among cattle in September."

*Swansea.*—Mr. Michael writes: "Two cases of small-pox have fallen under my observation in this town; one imported, and one without any apparent communication with an infected district. Scarlet fever has been unusually prevalent in a very fatal form. Sometimes death has occurred in twenty hours, without the appearance of an eruption, from blood-poisoning; in other cases, the anginose form, with intense coryza, has appeared to cause suffocation without much apparent external swelling of the throat. The rash has, in many cases, assumed the mulberry form, and has been attended at its decline with many eruptions—urticaria, lichen, papular efflorescence, etc. The great and severe changes of weather, often eight to ten degrees in a day, and the prevalence of cold easterly winds at the end of October and November, have led to many fatal cases of internal inflammation from checked transpiration from the skin. Peritonitis, nephritis, and similar affections have carried off many victims. In some parts of the town, the streets have been taken up to lay down a system of drainage, and in many of these parts the mortality has been severe. I am quite unable, however, to trace the mortality to this cause. It has occurred in every district; on the top of the hills surrounding the town, and in its lowest parts. The average number of deaths has been for some time, until the present, 14 per week; but it reached 35 in some of the weeks in November. During the prevalence of cold easterly winds, many sudden deaths occurred, especially from epilepsy and apoplexy. Measles

appeared to have entirely disappeared when scarlet fever became more intense."

*Wellingborough.*—Mr. Dulley says: "In the thickly populated and ill-drained village of Earl Barton, scarlet fever has been very prevalent during the whole quarter. Many children have been rapidly carried off by disease more resembling diphtheria than scarlatina maligna; in these cases there has been little or no redness of the skin, but they have commenced with stiffness of the neck, enlargement of the cervical glands followed by ulceration of the tonsils, excoriation of the mouth and lips, which sometimes are covered with aphthæ, shortness of the breath, loss of voice, fœtid breath, etc."

*Thetford.*—Mr. Bailey furnishes the following report for the quarter:

"*September.*—The weather throughout the month was particularly fine and dry. The amount of rain did not exceed three-fourths of an inch. The range of the atmospheric pressure was seven-tenths of an inch, and the prevailing winds were south and west. The temperature was high for the month, the maximum being 78°, and the greater part of the month not lower than 74° in the middle of the day; the evenings were considerably above temperate, or 55°. From the 18th, a considerable reduction of temperature took place, the range of the highest degree being 14°. During this time the greatest quantity of rain fell. The little variation of atmospheric pressure, the dryness of the air and higher temperature than usual, conduced much to the healthiness of the month. Simple scarlatina continued to attack the children in the Union Workhouse: in some cases, swellings of the maxillary glands and anasarca were the result, but no death occurred, nor did the disease extend into the town. A fatal case of croup occurred in a little child who had been attacked some days before medical aid was called in. One case only of ague came under observation. Remittent fever was very prevalent during the month, chiefly amongst the labouring classes, and in two instances in the higher classes. Catarrh and influenza were not so frequent, and in this month I have not known so few cases of diarrhœa. One case of typhus came under treatment; from peculiarity of habit, it became complicated and ran a long course, but ultimately recovered. A most serious case of carbuncle occurred in an elderly man: it was situated in the lumber region, and assumed a deep purple hue and produced extreme constitutional irritation. By early incision, stimulating poultices and tonic treatment, he ultimately did well. With children, I scarcely ever knew so few diseases under notice.

"*October.*—The diagram of the barometer showed great fluctuation for the month, which may, in some measure, be attributed to the force of the winds. The range was 1·2 inch; the prevailing winds south and west. The amount of rain was 1·25 inch, with only four days which were cloudless. The temperature at the maximum was 14° lower than last month. The evenings were cold, and on the night of the 8th a severe frost was experienced. The dew-point nearly equalled the temperature. This change of temperature with moisture gave rise to numerous cases of catarrhal affections and influenza; the latter being complicated with pneumonic symptoms, which in young persons required active treatment; throughout the month it must be considered epidemic. Bronchitic affections among children were more prevalent. Only one case of simple scarlatina occurred in the workhouse, and one case of measles, both of which required but little medical aid. Quinsy was frequently under notice, arising from exposure to the atmospheric changes. Rheumatism, acute and chronic, occurred more frequently during the month. Diarrhœa and remittent fever have lately occurred in four or five cases.

"*November.*—The temperature in this month may be recorded as unusually low, being several degrees below the average; at night, upon the grass, it was observed as low as 10°, and about five feet from the ground at nine o'clock in the morning at 15°. Such a state of temperature I have not observed and recorded for 48 years. The dense fogs, absence of winds, and the extreme cold have been severely felt. The diagram of the temperature has a complete wintry form. The maximum was on the 14th, at 54°; the minimum on the 24th, at 10°; being a range of 44°. The barometrical range during the month was very fluctuating, forming two considerable curves. The amount of rain was only a quarter of an inch; the prevalent winds were north and east. The dew point varied but little from the temperature. Scarlatina now assumes an epidemic character, spreading itself in various parts of the town, with tonsillar and pharyngeal inflammation. In some cases the eruption seems transitory, disappearing suddenly, while the febrile symptoms remain severe and greatest difficulty of swallowing. The disease has attacked a whole family, five in number, one of whom terminated fatally. In a mother and two children, although no eruption was observed, their mouths were covered with a yellow slough, exceedingly offensive, including the greenish tongue, very different to that of scarlatina anginosa, and which I should consider to be cases of diphtheria; their state is now very doubtful. Other cases in the town are also under

medical care, and which I consider contagious. Catarrhs are also very prevalent, and remittent fevers still continue under observation. From the extreme cold, children have suffered much from congestions of the lungs, with much febrile action. Rheumatism and sore throat have also been more prevalent. During the extreme cold many cases of diarrhœa occurred. These may be considered as the chief diseases arising from atmospheric vicissitudes. Upon inquiring of our veterinary surgeons, I understand a great mortality has taken place in many dairies from pleuropneumonia. In this locality some farmers have lost seven or eight from the disease. Strangles and fever have also attacked horses, and in some instances proved fatal. Sheep and swine seem to be very healthy.

*Record of Deaths in Twenty-one Parishes (population 9,574) from the Registrar's Book.*

| *September.* | | *October.* | | *November.* | |
|---|---|---|---|---|---|
| Typhus | 1 | Consumption | 1 | Diphtheria | 1 |
| Consumption | 1 | Inflammat. of lungs | 1 | Consumption | 3 |
| Croup | 1 | Paralysis | 2 | Paralysis | 1 |
| Disease of heart | 1 | Dysentery | 1 | Convulsions | 2 |
| Epilepsy | 1 | Debility | 1 | Disease of liver | 1 |
| Convulsions | 1 | Decay of nature | 3 | Erysipelas | 1 |
| Nephritis | 1 | | | Childbirth | 1 |
| Atrophy | 1 | | | Debility | 3 |
| Dropsy | 1 | | | Decay of nature | 3 |
| Debility | 1 | | | | |
| Decay of nature | 3 | | | | |
| Accident | 1 | | | | |
| | 14 | | 9 | | 16 |

*Stourbridge.*—Mr. Freer writes: "The epidemic of scarlatina now prevailing is of a severe type, the throat and glands being, in many instances, badly affected, and a fatal issue not unfrequently resulting. The mucous membrane of the throat is also affected in the vast number of cases of influenza now presenting themselves. On inspection of the fauces, however, but little can be seen beyond slight redness of the tonsils and uvula, this latter being also elongated. The tickling throat cough is often distressing. Two cases of diphtheria of the palate and tonsils, but not extending into the larynx, I attended in the weeks ending November 19 and 26. The first, in a boy aged 5, proved fatal on the 9th day from sheer exhaustion; the tonsils and pharynx became quite rotten, breaking up at the least touch. The second case (in an adult) did well. The characteristic white spot began on the soft palate, and extended thence to all the fauces. The weight of disease seems this quarter to have fallen especially on the throat in various ways."

*Barrowden.*—Mr. Swann says: "Scarlet fever had quite left us, but has again been introduced by a family from

Norwich. I have a few cases of small pox, but very mild. By care and threats I manage generally to confine it to the house where it first makes its appearance. I hear that at Oakham, our county town, it is very prevalent, as many as 150 cases lying at one time. I have had a remarkable case of erysipelas in a child about 2 years old; it began in the right foot, and gradually spread upwards to the loins, then gradually passed down the left leg to the foot, and then disappeared, leaving its usual consequences—œdema and discoloration."

*Pontesbury.*—Mr. Eddowes writes: "I have had four cases of typhus this quarter in three different districts, two miles apart. The first case was in a remarkably clean cottage, about a quarter of a mile distant from any other house, on high ground. The only inmates were a man and his wife, both strong and healthy people, between 40 and 50 years of age. They have one daughter, who is married, and lives at a distance. The wife was taken ill in September. On my first visit, as I went to the house, I observed a very offensive smell; it was less offensive when I had entered the house. I found her in bed with typhus. I immediately began to look about for the cause of the abominable smell, and soon found it. A few yards from the door was a stone cistern covered over with boards. I went to see what it contained. When I was within two yards or so of it, the smell became so intolerable that I stood, and having a stick in my hand, reached out and pushed off one of the boards. It was quite full of pig wash, which had been accumulating during the greater part of the summer; the thinner part had evaporated or drained away, it was of the consistence of grease or thick cream. The upper two inches were a mass of living maggots. I told the man that the stinking was the cause of his wife's illness, and that he must have it removed immediately. He said, 'I put my spade into it one day, and found about two inches of maggots on the top and some potatoe peelings quite fresh down about the middle of it.' The second and third cases were from filth and poor living; they occurred in a house where typhus had been twice before within the last 20 years. The last case I could not at first account for; it was in a very filthy neighbourhood, and near to a cottage where I had had a fatal case of diphtheria a short time before. On my first visit to the child with diphtheria I remarked to the mother that I smelled something very disagreeable. I found the stye at the end of the cottage, in a very filthy state, and a fat pig in it. The stye was a few inches above the floor of the cottage."

*Nottingham.*—Dr. Robertson writes: "Scarlet fever has been by far the most prevalent of the eruptive fevers during the quarter. Not only has the fever itself in its malignant form carried off great numbers of children, but "scarlatina faucium," as it is called by the older writers, in which the throat is affected and not the surface, has been widely spread over Nottingham and the surrounding district. Many cases of this affection, in which careful searching for two or three successive days would have discovered a slight eruption, have been confounded with diphtheria. This latter disease has assumed generally the characters presented in most of the reported cases elsewhere,—a leather-like exudation on the tonsils and sometimes the whole of the throat visible to the eye, and a red glazed appearance of the mucous membrane when this exudation was coughed up or removed. I have had in the hospital several cases of small pox. In one girl it was combined with scarlet fever (for which her medical attendant was treating her when he observed the small pox vesicle appear). In another case, the patient had been twice vaccinated, and had suffered from the disease before. Dysentery is much less prevalent than in the corresponding quarter of last year."

*Oswestry.*—Mr. Cartwright states that intermittent neuralgia has been very prevalent during the last fortnight of November.

*Gainsborough.*—Dr. Mackinder writes: "Had it not been for a fresh visitation of throat affection and the rapid increase of small pox, the past quarter would have been a remarkably healthy one, there having been much less than the usual amount of diseases incidental to the autumnal season. From diphtheria several deaths have occurred in the neighbourhood; one of which happened to a patient of my own, a young, vigorous woman, daughter of a farmer, to whom I was not called until asphyxia was impending. The particulars of this and the other cases of throat affection which have been under my care during the quarter, have been communicated to the Epidemiological Society. The small pox, which was introduced from Walesby on the 24th of July last, is now epidemic, scores of cases being in the town; some very mild, others severe. Eight deaths have been registered in the quarter. Of these, four had not been vaccinated; three were vaccinated in the stage of variolous incubation; and one, aged 45, had been vaccinated or inoculated in infancy. The *three* vaccinated were children, members of a family consisting of four. One of these four children had been vaccinated some time previously, was the first to contract the disease, and had it rather severely, but made a favourable convalescence. On the 2nd

September, three weeks afterwards, the other children were vaccinated, all successfully. On the following day variolous papulæ appeared on one of them; on the seventh day the disease was manifest in a second; and on the eighth day the third child bore unmistakeable evidence of the same affection. All became confluent; all had pulmonary complication; all died. The fact of the vaccination passing through its normal stages uninfluenced by the virus of small pox is worthy of notice. A woman, aged 50, who says she had a severe attack of small pox when 7 years old, is now suffering from that disease. In a yard, where the sunbeams seldom penetrate, and the zephyr never finds an entrance, a horrid, stinking, humanity-disgracing hole, having therein some sixteen habitations, I had under treatment, at one time, sixteen cases of small pox. Two deaths occurred in this place, being unvaccinated cases; and the worst case I ever saw after vaccination here passed through its various stages to health. Though there have been many very mild and modified cases of variola after vaccination, there have been more than a few of the confluent kind, where the vestiges of the Jennerian prophylactic were demonstrably evident. Some very mild cases have happened to the unvaccinated. Though my own opinion of the modifying influence of vaccination has not diminished, the prejudice entertained by a large body of the public will not, I fear, be attenuated by recent experience; the percentage of confluent cases being too great to foster confidence in the protective agency of the vaccine lymph. Re-vaccination has become general, and, as yet, with the best results; no re-vaccinated person having, within the range of my observation, been attacked with small pox. Two or three months ago, I requested the attention of the Board of Guardians to the subject of vaccination and exposure of variolous patients; but my warning was unheeded until the disease had gained an entrance into half the dwellings of the town! The door was ordered to be locked after the horse had escaped. Though we are better off than many localities, in reference to vaccination, that boon to humanity is not nearly so popular as it ought to be. Quackery is rampant in Lincolnshire. Homœopathy, hydropathy, Mesmerism, Coffinism, bone-setting, *et hoc genus omne*, have their numerous admirers, and luxuriate in their ill-gotten gains; but science is dormant, bloodless, and cold, pining under an extinguisher of ferruginous mould, longing for liberty and yearning to do good. 142 pauper patients have been attended in the quarter; 35 in September; 66 in October; and 41 in November;—55 in excess of the previous

quarter. Of these 142, twenty were between 60 and 70 years old; sixteen between 70 and 80 years old; and one between 80 and 90 years old. Small pox has not yet got possession of the workhouse, an establishment remarkable for its salubrity at all times."

The following meteorological report has been furnished by Mr. Dyson: "The weather was more unsettled last quarter than in the previous eight months of the year, and the principal rain-fall of the year was in September (2·46 inches) and in October (3·89 inches). An unusual amount of fog prevailed at intervals throughout. Ozone was abundant, as will be observed on reference to the accompanying table, all September, and less in the following months. The barometric pressure was unusually high at the close of October, the maximum being more than 30½ inches; on the 28th November it had fallen to 29·092 inches, accompanied by continued rain. The daily record is contained in the table."

*Hindley in Wigan.*—Mr. Hussey writes—"Phlegmonous erysipelas, puerperal diseases (which have been fatal in many instances), measles, and scarlet fever with bronchial affection, have very much prevailed during the latter end of the quarter ending with November. During the long and sharp frost of late, there was a remarkable increase of the above diseases; and since the change in the weather, zymotic diseases have doubled. The wind during the former period was of an easterly character—due east, north east, and for a time south east. During the latter period it has varied much; but has been principally from the west. Throat affections are rife just now, but of a mild character in this quarter. I have had three cases of tonsillitis in a family of three children—a circumstance I never before witnessed. In neither has there been any rash or strawberry tongue, or anything to indicate scarlatina—no desquamation even. In a sanitary point of view, it is remarkable to find erysipelas and puerperal diseases prevailing at one and the same time. The latter are fearfully on the increase, and there can be no question as to the identity of the two poisons. Erysipelas has crept into one of our neighbouring hospitals, and some of the patients who could do so have returned home, *pro tempore*. I administered a vermifuge to a child lately, in a pauper family, and the result was forty-two round worms, twenty-nine of which I counted myself. The water used for cooking comes from a pit in a field. An infant, eight months old, in the same family, has passed two round worms of late."

*York.*—Mr. Procter writes:—"September and October were

*Township of Gainsborough* (*population in* 1851, 7,261). *Deaths from Aug. 30th to Nov. 26th*, 1858, *inclusive.*

| Date. | Age. | Sex. M. | Sex. F. | Occupation. | Cause of Death. |
|---|---|---|---|---|---|
| Aug.30 | 27 yrs | — | 1 | D. of labourer | Gastro-enteritis |
| Sep. 14 | 61 „ | 1 | — | Labourer | Chronic peritonitis |
| „ | 3 „ | — | 1 | D. of labourer | Variola |
| 17 | 1 „ | 1 | — | S. of labourer | „ 10 days, diarrhœa 9 days |
| 19 | 7 „ | 1 | — | S. of labourer | Marasmus 3 years and 9 mos. |
| „ | 5 „ | 1 | — | S. of labourer | Variola 22 days, diarr. 2 days |
| 21 | 3 „ | 1 | — | S. of charwoman | Hooping cough, pneumonia |
| 27 | 24 „ | 1 | — | Journey. blacksmith | Phthisis |
| 25 | 46 „ | — | 1 | W. of bricklayer | Dropsy* |
| 26 | 45 „ | 1 | — | Rag gatherer | Chronic bronchitis with emphysema |
| 28 | 54 „ | — | 1 | Widow of seaman | Cirrhosis of liver 4 years, ascites anasarca 2 months |
| Oct. 4 | 10 „ | 1 | — | S. of brickl. labourer | Diphtheria 6 days, cynanche maligna 3 days |
| 1 | 20 „ | — | 1 | D. of farmer | Phthisis pulmonalis 18 mos. |
| 3 | 55 „ | — | 1 | W. of gardener | Valv. dis. of heart 2 yrs., bron- |
| 7 | 30min | — | 1 | D. of labourer | Premature birth [chitis |
| 11 | 1 yr. | 1 | — | S. of hairdresser | Convulsions, typhoid fever |
| 14 | 45 „ | — | 1 | W. of draper's assist. | Small-pox confl. 6 dys.,(vaccin.) |
| 16 | 68 „ | 1 | — | Formerly a groom | Dysentery and anasarca |
| 26 | 70 „ | 1 | — | Agricl. labourer | Valvular dis. of heart, anasarca |
| 24 | 3wks | 1 | — | S. of dressmaker | Bronchitis |
| 26 | 12yrs | — | 1 | D. of labourer | Meningitis |
| 29 | 36 „ | 1 | — | Horse clipper | Exhaustion caused by constant intemperance† |
| 31 | 23 „ | — | 1 | D. of retired seaman | Diphtheria |
| Nov. 4 | 66 „ | 1 | — | Labourer | Malignant tumour of side |
| 5 | 86 „ | — | 1 | Widow of pensioner | Bronchitis |
| 8 | 83 „ | — | 1 | Widow of labourer | Paralysis, diarrhœa |
| 9 | 9 „ | — | 1 | D. of labourer | Dis. of mesenteric glands, 8 yrs. diseased spine 5 yrs., abscesses 5 yrs., variola 3 days |
| 12 | 25 „ | — | 1 | D. of druggist | Phthisis 2 years |
| 18 | 8 „ | 1 | — | S. of labourer | Small-pox (not vaccinated) |
| 19 | 76 „ | 1 | — | Former. schoolmaster | Atonic apoplexy |
| 20 | 9 „ | — | 1 | D. of labourer | Small-pox (not vaccinated) |
| 21 | 62 „ | — | 1 | W. of seaman | Obstruction of bowels 9 days |
| 22 | 58 „ | 1 | — | Cooper | Intermittent fever 5 months, chronic enteritis, perforation |
| 21 | 50 „ | — | 1 | W. of cordwainer | Obstruction of bowels 8 days |
| 21 | 14 „ | — | 1 | D. of joiner | Dis. of the heart accompanied with water in the chest‡ |
| 23 | 18 „ | 1 | — | Waterman | Small-pox 14 days (not vaccin.) |
| 25 | 74 „ | — | 1 | Widow of waterman | Softening of brain, apoplexy atonic |
| 24 | 18 „ | 1 | — | Oil-mill labourer | Small-pox 19 days, pneumonia 10 days |
| Total .... | | 19 | 19 | = 38 | |

The number of births during the above named period was 52; viz. males 30, females 32.

* Cause of death not certified. † Certified by coroner. ‡ Certified after *post mortem.*

| Treatment commenced. | Diseases of Private Patients. | Diseases of Pauper Patients. | Barometric pressure at the temp. of 32° Fahr. | Temperat. Dry bulb. | Temperat. Wet bulb. | Direction of Wind. | Rain in 24 hours. | Ozone. (Schoen.) | Remarks. |
|---|---|---|---|---|---|---|---|---|---|
| Aug 28 | Ovaritis, dyspepsia [diarr. | | 29·737 | 54 | 49 | NW. | ·0 | — | |
| 29 | Bronchitis,lumbago,emphysema,colic, | | 29·723 | 68 | 58 | NW. | ·05 | 8 | Fine to end of month |
| 30 | Dysuria, uterine hæmorrhage, dysen. | | 29·555 | 59 | 54 | SW. | ·09 | — | |
| 31 | Congestion of brain, ozæna, gastralgia | Diarrhœa | 29·603 | 52 | 50 | SW. | ·20 | 9 | |
| Sept. 1 | Cephalalgia intermittens, anæmia, intercostal neuralgia | | 29·544 | 63 | 58 | SW. | ·0 | — | Showery till the 8th |
| 2 | Tonsillitis, hæmorrhoids | Anæmia | 29·773 | 60 | 55 | S. | ·25 | 10 | |
| 3 | Encephalitis, prurigo incontinentia, | Epilepsia, congestio cerebri | 29·584 | 64 | 62 | S. | ·60 | 3 | |
| 4 | Epilepsia, gastrodynia [pleurodynia | Strumous ophthalmia | 29·645 | 63 | 62 | SW. | ·06 | — | |
| 5 | | Bronchitis, emphysema, lumbago | 29·742 | 65 | 60 | SW. W. | ·14 | 5 | |
| 6 | [tation | Diarr., rheumat., pleurisy, emphysema | 29·771 | 58 | 54 | SW. S. | ·04 | 8 | |
| 7 | Faucitis,diarr.,anæmia from hyperlac- | Paralysis | 29·686 | 58 | 56 | SW. | ·06 | 2 | Fine till the 14th |
| 8 | Febricula, intertrigo, diarr., dysentery | | 29·750 | 65 | 63 | S. NW. | ·0 | — | |
| 9 | Puerperal convulsions | | 29·854 | 61 | 56 | S. | ·0 | 10 | |
| 10 | Hooping cough, vermes, strophulus | Ophthalmia | 29·784 | 65 | 61 | S. | ·0 | 6 | |
| 11 | Diarrhœa, scarlatina [weather | Variola, diarrhœa | 30·020 | 68 | 63 | S. | ·0 | — | |
| 12 | Hyperlactation, syncopia from heat of | | 30·152 | 65 | 61 | S. | ·0 | 10 | |
| 13 | Lichen, bronchocele, diarrhœa | Constipatio | 30·109 | 64 | 61 | SE. | ·0 | 10 | |
| 14 | Hooping cough, colic, supersecretion of milk | Faucitis | 30·222 | 58 | 57 | NE. | ·0 | 10 | Fog |
| 15 | Choleraic diarrhœa, small-pox, œdema | Petechiæ from want of food, faucitis | 30·200 | 59 | 57 | NE. | ·0 | 10 | ,, |
| 16 | Leucorrhœa, variola | Furuncle, neuralgia, hemicrania | 30·150 | 57 | 56 | SE. | ·0 | 10 | ,, |
| 17 | | Icterus, carbuncle | 29·809 | 64 | 62 | SE. | ·30 | 10 | |
| 18 | Diphtheria, diarrhœa | | 29·866 | 60 | 56 | SW. | ·0 | — | Thn.,lg.&rn. |
| 19 | Colic, ophthalmia neonatorum | Dysentery, colic, morbus coxæ | 30·192 | 58 | 54 | SW. N. | ·0 | 10 | |
| 20 | Strumous ophth., bronchitis, emphys. | Lumbago, dropsy, icterus, diarrhœa | 30·212 | 58 | 56 | N. | ·0 | 2 | |
| 21 | Intercostal neuralgia,scarlat.,hoop.ch. | Neuralgia | 30·259 | 51 | 50 | NE. | ·0 | 10 | Fog |
| 22 | Herpes, tonsillitis, diarr., neuralgia | Stomatitis, anthrax, rheumatism | 29·869 | 59 | 56 | E. | ·48 | 10 | Rain |
| 23 | Constipation, tonsillitis, dysentery | | 29·588 | 64 | 61 | SE. | ·02 | 3 | |
| 24 | Diarrhœa, dropsy after scarlatina | Dysentery | 29·980 | 60 | 55 | W. | ·0 | — | Fine |
| 25 | Tonsillitis, diphth., prurigo, rheumat. | Diarrhœa | 30·457 | 56 | 53 | SW. | ·0 | — | ,, |
| 26 | Gravel, rheumatism | Variola | 30·436 | 63 | 60 | W. | ·0 | — | ,, |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 27 | English cholera | | 30·245 | 61 | 59 | NW. | ·0 | — | „ |
| 28 | Variola,ecthy.,eczema impetiginoides | | 30·199 | 57 | 52 | NW. | ·02 | 10 | „ |
| 29 | Febris, erythema, dysenteria, diphth. | Chlorosis | 30·091 | 55 | 53 | SE. | ·09 | 10 | „ |
| 30 | Congestio cerebri, lumbago, colica, dysentery | | 29·542 | 58 | 57 | SE. | ·40 | — | Heavy rain |
| Oct. 1 | Hæmatemesis vicariosa,tonsillitis, fu- | | 29·992 | 50 | 47 | SW. | ·25 | 10 | |
| 2 | Bronchitis, pleuritis [runcle,diarr. | Diarrhœa | 29·922 | 55 | 53 | SW. | ·0 | 10 | Fine |
| 3 | | [rheum. | 29·878 | 68 | 61 | SW. | ·0 | 10 | „ |
| 4 | Pityriasis [colic | Diarr., scabies, tonsillitis et faucitis, | — | 58 | 55 | S. | ·08 | — | „ |
| 5 | Bronchitis,hoop.cough,dysen.,gonorr., | Emphys.,catarrh, phthisis, strum.oph. | 29·672 | 50 | 48 | SW. | ·02 | — | „ |
| 6 | Erysip.,diarr., dysen., anæmia, dentitis | Diarrhœa, erythema nodosum,variola, | 29·943 | 48 | 46 | W. | ·0 | — | „ |
| 7 | Diphtheria, diarr., hoop. cough, gout, dysentery, varioloid, phthisis | Herpes, lumbago [lichen | 29·259 | 54 | 51 | S.NW. | ·02 | — | „ |
| 8 | Phthisis, neuralgia [dialgia | Faucitis, diarrhœa, rheumatism | 29·529 | 48 | 44 | NW. | ·0 | — | |
| 9 | Pneum., scarlat.anginosa, faucitis,car- | Dysentery, faucitis | 29·846 | 43 | 41 | NW. | ·06 | 10 | Boisterous |
| 10 | Dysen., hoop. cough, faucitis & tonsil- | Dyspepsia | 29·469 | 51 | 49 | SE. | ·32 | — | |
| 11 | Lichen [litis | | 29·498 | 45 | 45 | SE. | ·21 | — | |
| 12 | Hoop. cough, bronchitis & emphysema | Faucitis, tonsillitis | 29·853 | 48 | 47 | SW. | ·25 | 2 | |
| 13 | Abortio, vertigo | | 29·898 | 56 | 56 | NW. | ·0 | — | |
| 14 | Anæmia | Faucitis, variola, bronchitis, diarrhœa | 30·091 | 57 | 56 | NW.SW. | ·0 | — | Fine |
| 15 | Menorr., epilepsia, amenorr., paralysis | Neuralgia, variola, bronchitis | 30·027 | 58 | 57 | SW. | ·0 | 3 | |
| 16 | Erysip.,diarr., atrophia, purulent opht. | | 29·799 | 57 | 56 | SW. | ·0 | — | |
| 17 | Bronchitis, incipient paralysis | Carbuncle, lumbago | 29·777 | 55 | 51 | SE.NW. | ·0 | — | |
| 18 | „ , intertrigo,faucitis with exanthem | Hæmatemesis | 29·902 | 45 | 44 | NW. | 1·15 | 10 | Rain and fog |
| 19 | Diarrhœa, intercostal neuralgia | | 29·877 | 48 | 46 | N. | ·88 | 10 | the end of |
| 20 | Dyspepsia, orchitis | Erysipelas, mania | 29·763 | 53 | 53 | N. | ·04 | 2 | the month |
| 21 | Tonsillitis | Bronchitis, diarrhœa, epilepsy, colic | 29·894 | 47 | 46 | N. | ·0 | 2 | |
| 22 | | Laringismus stridulus, trichonosis | 30·030 | 51 | 50 | NE. | ·0 | — | |
| 23 | Bronchitis, anæmia from prolonged | Erysip., sclerotitis, bronchitis, variola | 30·117 | 48 | 48 | NE. | ·0 | — | |
| 24 | Cerebral congestion, diarr. [lactation | Phthisis, rheum., bronchitis, pleuritis | 30·122 | 49 | 48 | NE. | ·0 | — | |
| 25 | Erysipelas | Conjunctivitis, diarrhœa, variola | 30·404 | 48 | 46 | NW. | ·0 | — | |
| 26 | Faucitis, menorrhagia | Gastrodynia | 30·395 | 49 | 48 | NW. | ·0 | — | |
| 27 | Diphtheria, faucitis | Porrigo, pneumonia, dysentery | 30·306 | 47 | 46 | S. | ·52 | — | |
| 28 | | Variola | 30·081 | 49 | 49 | N. | ·09 | — | |
| 29 | Diphtheria | Variola, leucorrhœa | 30·364 | 41 | 39 | N. | ·0 | — | |
| 30 | Faucitis, tonsillitis, otorrhœa, catarrh | Tonsillitis | 30·624 | 38 | 38 | N. | ·0 | — | |
| 31 | „ „ , scarlatina anginosa | Variola | 30·693 | 45 | 43 | N. | ·0 | — | |

The term *faucitis* I have applied to the cases of diphtheria when in the first stage; *i.e.* before any white deposit is found.

| Treatment commenced. | Diseases of Private Patients. | Diseases of Pauper Patients. | Barometric pressure at the temp. of 32° Fahr. | Temperat. | | Direction of Wind. | Rain in 24 hours. | Ozone. (Schoen.) | Remarks. |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Dry bulb. | Wet bulb. | | | | |
| Nov. 1 | Faucitis, tonsillitis, diphth., paralysis | Arthritis, diarrhœa, paralysis | 30·535 | 47 | 46 | N. | ·04 | — | Dense fogs and showers to the end |
| 2 | Diphtheria, dyspepsia, herpes, dropsy | Scabies, impetigo | 30·453 | 48 | 47 | SE. | ·0 | — | |
| 3 | Orchitis, neuralgia, diarrhœa | Herpes, bronchitis, paralysis | 30·404 | 46 | 45 | W. | ·0 | — | |
| 4 | Faucitis, dysentery, variola | Bronchitis, faucitis, variola | 30·357 | 47 | 46 | N. | ·04 | — | |
| 5 | „ , diphtheria, mammitis, bronchitis, varioloid | | 30·226 | 46 | 44 | W. | ·09 | 6 | |
| 6 | Faucitis, impetigo, gout | Rheumatism | 30·404 | 40 | 37 | W. | ·01 | — | |
| 7 | Diphtheria, neuralgia, variola | | 30·483 | 40 | 39 | N. | ·0 | — | |
| 8 | Colic | Lumbago, asthma, herpes, fistula in ano | 30·365 | 43 | 41 | N. | ·04 | — | |
| 9 | Faucitis, leucorrhœa | Bronchitis, variola, faucitis | 30·490 | 41 | 40 | N. | .01 | — | |
| 10 | Faucitis | Scabies, bronchitis, variola, rheumatism | 30·439 | 38 | 37 | W. | ·01 | — | |
| 11 | „ , diphtheria, porrigo scutulata | Lichen, variola, faucitis | 30·384 | 40 | 39 | W. | ·0 | 8 | |
| 12 | „ „ | Meningitis, variola, catarrh, hepatitis | 30·196 | 37 | 36 | SE. | ·0 | 4 | |
| 13 | Metritis, faucitis, diphth., periostitis | Dysentery, catarrh, variola | 29·790 | 32 | 32 | E. | ·0 | 10 | |
| 14 | Faucitis, diphtheria, catarrh, diarrhœa | Catarrh, dyspepsia, jaundice, apoplexy | 29·503 | 46 | 42 | E. | ·02 | 10 | |
| 15 | „ „ , gravel, variola, piles | Valvular disease of heart, variola | 29·819 | 40 | 35 | E. | ·0 | 7 | |
| 16 | Erysipelas, scabies, diarrhœa | | 29·634 | 35 | 32 | E. | ·0 | 2 | |
| 17 | Faucitis et adenitis, vermes | Laryngismus stridulus, rheumatism | 29·618 | 38 | 35 | E. | ·0 | 3 | |
| 18 | Epileptoid, bronchitis | Diarrhœa | 29·741 | 34 | 32 | N. | ·0 | — | |
| 19 | Diarrhœa, intercostal neuralgia | Colic, ramol. cerebri | 29·826 | 32 | 32 | NW. | ·02 | — | |
| 20 | Dyspepsia, orchitis | Orchitis, paralysis, variola | 29·934 | 35 | 34 | NW. | ·0 | — | |
| 21 | Tonsillitis | Variola | 30·148 | 35 | 34 | N. | ·0 | — | |
| 22 | [lactation | | 30·228 | 25 | 24 | N. | ·0 | — | |
| 23 | Bronchitis, anæmia from prolonged | Adenitis | 30·089 | 18 | 17 | N. | ·0 | — | |
| 24 | Diarrhœa, cerebral congestion | Eczema, bronchitis, gravel | 29·934 | 21 | 20 | N. | ·01 | 2 | |
| 25 | Erysipelas | Herpes zoster, rubeola, faucitis | 29·521 | 39 | 38 | SE. | ·35 | 8 | |
| 26 | Faucitis, menorrhagia | Bronchitis | 29·259 | 48 | 48 | SE. | ·03 | 10 | |

by no means unhealthy months and had rather less of the ordinary autumnal complaints. During November there has been a considerable amount of disease, still not particularly fatal."

*Lerwick.*—Dr. Spence writes :—"September, especially the latter half of it, was very changeable, boisterous, and wet. The beginning of October was remarkably stormy. On the 1st a vessel in the roadstead was struck by lightning and seriously damaged; and on the 7th it blew a perfect hurricane from the south east. Easterly winds prevailed during the middle of October, which was variable and wet, and there was a slight fall of snow on the 28th. The first few days of November were foggy and rainy; the remainder of the month was seasonable with prevailing northerly winds, and the ground was covered with snow from the 18th to the 22nd inclusive. Comparing this quarter with the corresponding period last year, there was a striking rarity of diarrhœa, and a decided prevalence of influenza. Scarlet fever occurred in the second week of September, and about the same time I saw a case of dropsy, with desquamation of the cuticle, which I think must have been scarlatinal. There was one case of modified smallpox, imported from Leith, but the disease did not spread. Ordinary catarrh was less prevalent than usual. Influenza prevailed epidemically during the last half of the quarter, not only in Lerwick, but as far as I could learn, throughout the whole of the Shetland Isles. Influenza is generally said to spare infants; but in this epidemic children from six to twelve months were almost without exception attacked with bronchitis of an apparently alarming severity, though in my own practice there were no fatal cases. Otitis was a very common complication of the influenza. I saw one case where there was an eruption slightly resembling scarlatina, and in several cases there were aphthæ in the mouth, which might have deceived careless observers into a belief in the presence of diphtherite. The case of gastric fever (by which I mean the mild form of typhoid or gastro-enteric fever) as well as the case of puerperal fever, both occurred in an undrained locality with much putrifying animal matter in the neighbourhood. The number of deaths was eleven; the average age at death was forty-five, there being four below five, and five above seventy. The causes, where I could ascertain them, were—paralysis, two; infantile convulsions, one; valvular disease of heart, three; chronic bronchitis, one; jaundice, one; debility from want of breast-milk, one; extensive burn of chest, one."

# SANITARY LEGISLATION.

There is not much to be said in this department on the present occasion, for the parliamentarians have been taking their ease, and active sanitary legislation of all kinds is meanwhile suspended.

An outbreak of *Endemic Fever at Windsor* has led to some discussion, and Mr. Simon and Mr. Austin have made inquiries as to cause, and found the cause to be local.

The gigantic scheme for the *Main Drainage of London*, adopted by the Metropolitan Board of Works, proceeds showly, but much too fast, after all. The plan being determined on, it is not necessary to do more now than regret. The fact is, the Metropolitan Board have been driven into the acceptance of this scheme by popular cry that something must be done.

Mr. Neison, the actuary, has opposed the theory of the commissioners appointed to inquire into the *Sanitary State of the Army* regarding the production of phthisis pulmonalis by overcrowding. Mr. Neison's statistical inquiries go on their part to show "that deaths from consumption in overcrowded districts are increased in a much less ratio than the deaths from other causes." It were well if Mr. Neison would study physic as well as figures, for his argument, though alarming in its statistical details, has, running through it, an entire misapprehension of the whole question of phthisis and its causes.

The *Vaccination System* is, we hear, about to be reconsidered in Parliament. The present act is an entire failure, and the Registrars express their entire inability to carry out the rules imposed by it. The Registrar of a large metropolitan district informs us that vaccination returns are not made on even one-third of the children registered by him. *Apropos* to this remark, we may mention that in America, not less than in England, the vaccination question, as a State question, is beset with difficulties, and that vaccination is very imperfectly performed throughout the whole of the United States. At this time, a committee appointed by the Senate of the States is holding its meetings with a view to suggest an effective measure for the regulation and improvement of the sanitary police of New York. One point thus brought before the committee refers specially to vaccination and to the clauses of a proposed bill in which great power is given to the health officers of interfering with families affected with small-pox. The truly English cry of "freedom of the subject" is as loud in America as here, and we shall be interested in hearing how our cousins meet the difficulty of compounding between life and liberty.

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